Amateur Radio

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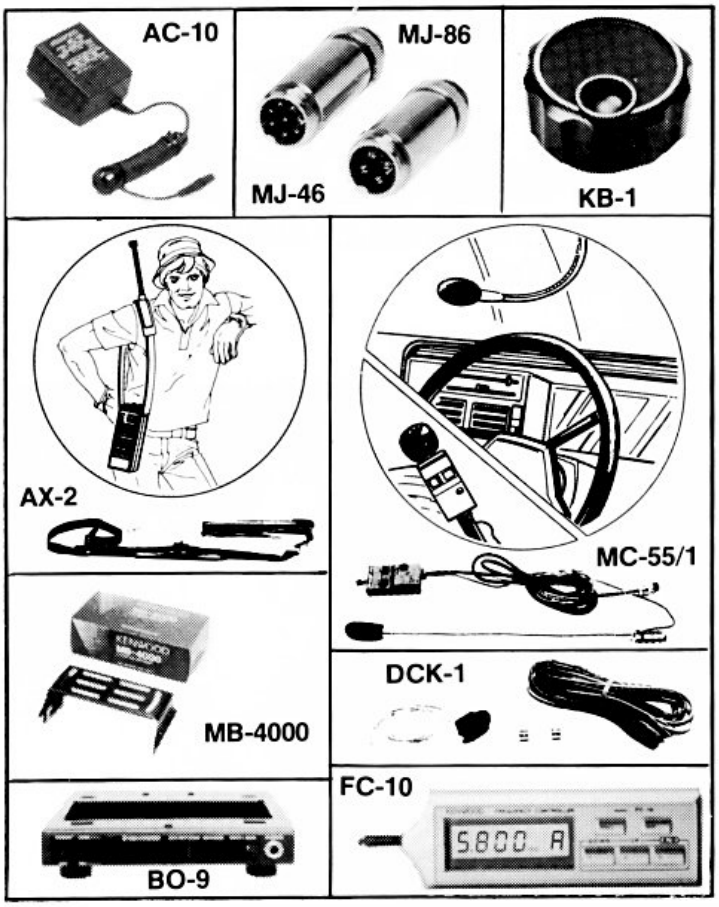
KENWOOD SUMMER CLEARANCE



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Amateur Radio

Publications galore on all aspects of the hobby were handled by Victoria WIA Councillor and Outwards QSL Manager John VK3DHE, being ably assisted by his young daughter Megan. Ian VK3CIS (right), was one of the many amateurs who kept John and Megan quite busy over the weekend whilst extending their technical libraries.

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DEADLINE

All copy for inclusion in the March 1988 issue of Amateur Radio, including regular columns and Hamads, must arrive at PO Box 300, Caulfield South, Vic. 3162, at the latest, by 9 am, January 19, 1988.

Amateur Radio

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HAMADS should be sent direct to the same address, by the same date.

Acknowledgment may not be made unless specifically requested. All important items should be sent by Certified Mail. The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying a reason.

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Editor's Comment

GLASS BOTTLES

An era has recently ended in Melbourne, and the glass milk-bottle is no more. Instead, the milkman brings plastic bottles or plastic-coated cardboard cartons. Neither is recyclable, but apparently they are more cost effective.

This superseding of glass by plastic seemed at odds with another recent news item, about glass fibre succeeding microwave links as they in the past succeeded coaxial lines and the old open wires. Melbourne and Sydney are now linked by optical fibres providing something like a hundred times the bandwidth of microwave and coax together. Soon the world's longest optical fibre will cross the Nullarbor, linking West and East with thousands of phone conversations and dozens of video links simultaneously, not to mention data circuits. Telecom triumphs again!

In amateur practice we have also seen the phasing out of glass bottles. Who but old-timers now talk of 807s and 6V6s? How many old-time exponents of CW had to give the code away because they developed the dreaded "glass arm"? Still, in place of CW we can use radio-teletype, perhaps in its most developed form with CRT output. "Glass RTTY" on a "modulated milk-bottle"! This is one kind of "bottle" still unsurpassed. Look at any TV set.

Glass seems to have had, and still is having, a great effect on society. Glassy-eyed, I lapsed into a reverie and found myself aboard HMS Sirius, heading for Botany Bay towards the end of 1787. The sea was glassy, unruffled by any breeze. Captain Phillip raised his glass to his eye and scanned the horizon.

"The glass is falling, captain, we will have wind soon", announced one of his lieutenants.

Sure enough, the wind came, and the fleet arrived on January 20, 1788. Preferring Port Jackson, they moved from Botany Bay, and on January 26, proclaimed the Colony of New South Wales. They raised their glasses in a toast to the King; and abruptly I returned to the Bicentennial present!

Perhaps, you say, it might have been better had I stayed in 1788! But seriously, may we all remember happily this year of 1988. May Australia's 200th birthday as first a colony but later an independent Commonwealth be a joyful occasion for all. And without needing rose-coloured glasses!

Bill Rice AX3ABP
Editor

"Never mind the QSL card, OM — just sent the IRCs! ! !"

—VK2COP

FEDERAL NEWS

There is no Executive Meeting to report on this month — I'll have two meetings to report on in February *Amateur Radio*. Also, a Joint DOTC/WIA Meeting was held on November 25, 1987 — there will be a report on this meeting in the next issue of *Amateur Radio*.

There was a Publications Meeting held in this office on Tuesday, November 10, 1987. General discussions took place on front covers, technical articles, various lettersto the Editor and his replies, and the financial position of the magazine. The Secretary reported that costs would run over budget for 1987.

BACK ISSUES OF AMATEUR RADIO

The Federal Office and some of the Divisions have some back issues of the magazine. Not every month is represented, but we have copies going back to 1983. These are for sale at $3.00 each, plus postage of 95 cents in VK3 Division, and $1.05 everywhere else.

NOVICE STUDY GUIDE

Don't forget the Novice Study Guide is available from the Divisional Bookshops and the Federal Office — priced at $2.50 plus post. The Institute's Federal Education Co-ordinator, Brenda Edmonds and her committee have worked very hard to put this together. The following endorsement comes from the Department of Transport and Communications:

"This guide has been developed in conjunction with the Department of Transport and Communications and is endorsed by the Department as suitable for use by persons studying for the Novice Amateur Operators Certificate of Proficiency."

SPECIAL CALL SIGNS

The Department of Transport and Communications have written regarding the difficulties associated with the issue of non-standard special call signs to amateur stations. They explain that in Australia the prefixes VK, AX and VI have been allotted to the amateur service. The latter two prefixes are, at present, only utilised on a temporary basis to signify special events. Formation of the full call sign issued to an individual station is subject to strict provisions contained in the Radio Regulations. In the case of amateur call signs, the formation prescribed is two characters and a single digit followed by a group of not more than three letters (VK1GD, VK3GDA, etc).

Call sign combinations which might be confused with distress signals and operational terms, such as SOS or the Q Code are prohibited. Similarly, combinations commencing with a digit when the second character is the letter O or I are not allowed.

Requests received by the Department for call signs that do not comply with the format outlined (ie VI88NSW, etc) require approval to be sought from the International Telecommunications Union.

It is not appropriate for the Department to initiate an approach to the ITU unless the requested call sign is for use during a special event of national significance. The number of any such requests will be restricted to a reasonable level.

An approach was made to the ITU and special approval received for the Australian Amateur Service to employ several non-standard commemorative call signs during the 1988 Bicentennial. The Department is, however, continuing to receive requests from individual amateurs and clubs requesting authorisation to use non-standard call signs as part of the 1988 celebrations.

The Department advises the amateur community that no further approaches to the ITU will be considered as part of the Bicentennial activities.

I have been taken to task for using initials in writing this Federal News column. I apologise to those members who have not been able to follow parts of this page because of the use of initials. I also apologise to those members who know and understand their meaning, because I'm now going to give the words for the initials!

Here are just a few:

DOTC	Department of Transport and Communications
FTAC	Federal Technical Advisory Committee
ITU	International Telecommunications Union
IARU	International Amateur Radio Union
IREE	The Institution of Radio and Electronics Engineers Australia
EMC	Electro-Magnetic Compatibility

1988 SUBSCRIPTIONS

If you have not paid your subscription for 1988, yet — please give it some thought. It would be a shame to miss continuity of your magazines!

1988 CONVENTION

It is time to start to think about Conventions again. Remember this is the member's forum to have his say on a range of topics close to an amateur's heart. The correct procedure, if you feel sufficiently strongly on a particular subject, is to write in the first instance to your *Federal Councillor* in your Division. The Federal Councillor plays his part by collating all the ideas from the members of his Division and forwarding them in the form of *Agenda Items* to the Federal Office. These are then numbered and forwarded to all other Divisions to discuss with their members at meetings or at club level, to gauge how to vote at the Convention.

When the Agenda item comes up for discussion during the Federal Convention, the Federal Councillor, and the Alternate Federal Councillor will discuss and vote on your behalf.

I hope to have the agenda items from Divisions in as early as possible so as to be able to print them in *Amateur Radio* before the Convention.

The 1988 Federal Convention is scheduled to be held on April 23, 24 and 25, 1988.

ITEM OF INTEREST

USSR/CANADA 1988

In February 1988, a joint Soviet-Canadian expedition will leave the Severnaya Zemlyn Archipelago to cross the North Pole to Canada by ski. The trip will end at Cape Columbia on Ellesmere Island, a distance of some 2 000 kilometres, and will take 90-100 days.

Team members. Soviet and Canadian, will carry all the necessary equipment in their rucksacks, including food, a tent, sleeping bags, pneumatic dinghy-boats, radio and navigational equipment for carrying out the scientific experiments and observations in the fields of medicine and geophysics.

There will be six planned air-drops, with no landing, except in case of emergency.

The Canadian Radio Relay League, Inc, representing Canadian amateur radio operators, has agreed to act as the expedition co-ordinator for all amateur radio communications, to and from Canada, in support of this important expedition, which is a unique example of international co-operation.

To their knowledge, it represents the first time that amateur radio has been used to provide basic radio communications for an undertaking of this magnitude.

Just something to think about whilst enjoying our January weather!

Compiled by: Ann McCurdy

YOUR TWO METRE YAGI VERTICAL OR HORIZONTAL?

George Cranby VK3GI
PO Box 22, Woodend, Vic. 3442

I am sure that many other amateurs have found themselves in the same predicament as I did — how to change the polarisation of a two metre Yagi beam from vertical, for FM, to horizontal, for SSB.

My two metre antenna, a 12-element ZL Special with four added reflector elements, is mounted on a 1.8 metre wooden extension above my HF beam. The use of wood — a 35 mm diameter pole — is, of course, necessary to prevent field distortion when using vertical polarisation.

I originally designed and built a manual tilting device. It was operated by pull-lines from ground level and used an over-centre cam to keep the beam either in one or the other position. A disadvantage of the device — apart from the usual tangled pull-lines — was the fact that my aerial tower is located 30 metres from the shack; the frequent cold and wet weather at this QTH made the prospect of leaving the shack for the wild outdoors every time I wanted to switch from FM to SSB and vice-versa was most unattractive.

The solution? Remote control by the new-fangled electric power. But how? I could not install a power line because all my cabling is run in underground conduit, and the conduit is full.

I am in a difficult television reception area and had constructed a masthead amplifier. This device is fed with 12 volts DC via the coaxial antenna line, the +ve being injected into the centre conductor and the earth -ve into the copper braid. The DC voltage is blocked on both ends by capacitors in the -ve line to prevent it feeding back into the television set on one end, and being shorted by the balun on the antenna end. Chokes on both ends prevent RF entering the DC supply.

I realised that I could send 12 volts DC up the coaxial feedline!

My tilting device operated by raising and lowering a short lever attached to the boom of the antenna at 45 degrees. I decided to operate this lever, via a connecting rod, by a half turn of an old windscreen wiper motor. Of course, that would be fine during the day when I could see the antenna and operate a control switch until the antenna had accurately changed position. But what about at night? Limit switches? Yes, but how to reset them without another cable connection?

The answer was a timer which could be set once, in daylight, to exact time required to move the antenna through 90 degrees. I chose a 555 device operating a 12 volt relay. Figure 1 shows the timer circuit.

Figure 2 shows the control box wiring and the timer PCB. Provision is made for manual adjustment and for automatic timing, as well as for LEDs indicating "power on" and "operation". The box is a small commercial type and the control switch is a DPDT type, momentary

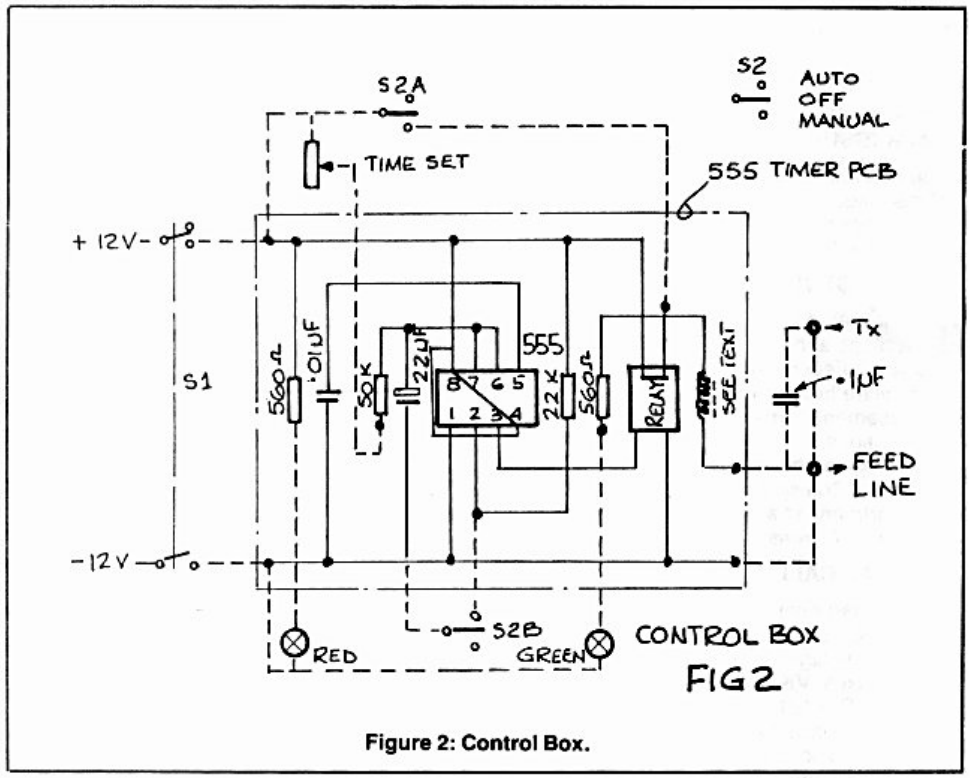

Figure 2: Control Box.

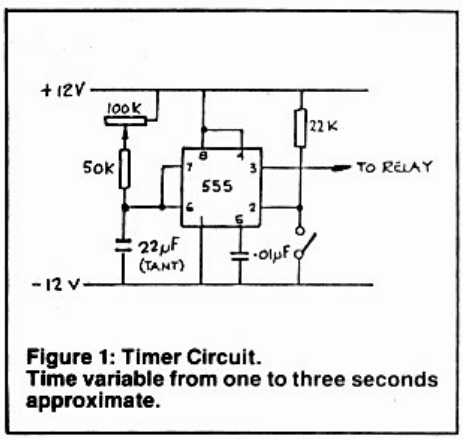

Figure 1: Timer Circuit.
Time variable from one to three seconds approximate.

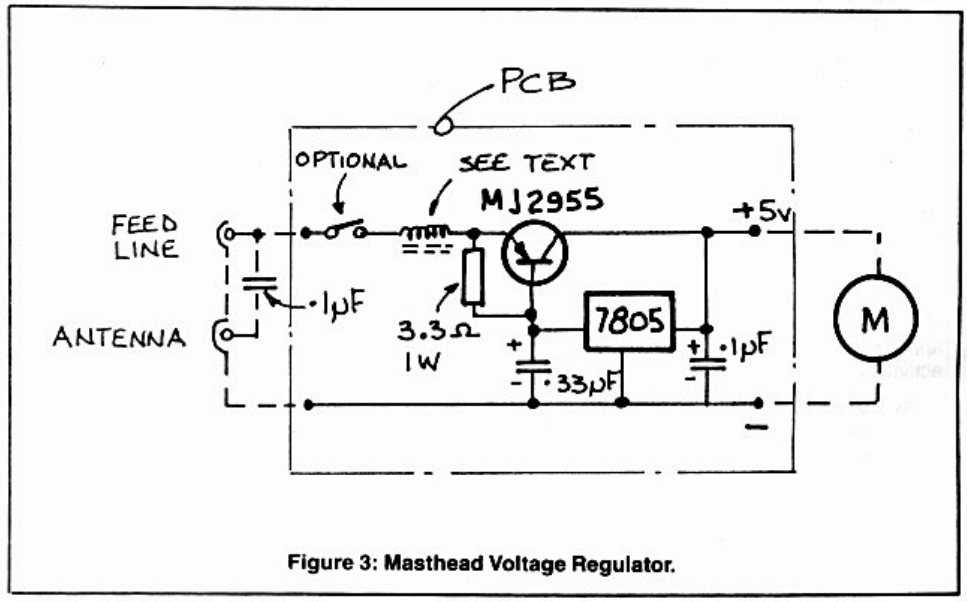

Figure 3: Masthead Voltage Regulator.

action with spring return to centre. Two coaxial sockets connect to the transmitter and to the feeder cable. Test for correct operation on the bench before connecting to the feeder.

In order to slow the wiper motor down and avoid inertia effects on the beam, I used the slow speed terminal wires — most wiper motors have three wires, giving a choice of speeds — and reduced the voltage to five volts. This was achieved with a 7805 regulator located in the masthead box which houses the wiper motor.

Figure 3 shows the masthead box circuitry with DC and RF blocking, the 7805 voltage regulator and an MJ2955 power transistor to obtain adequate current rating. The RF blocking chokes shown in Figures 2 and 3 consist of 10 turns of 22 gauge enamelled copper wire wound on small balun cores.

The motor has a short rotating lever arm; for proper operation the length of the antenna tilting lever must be *exactly* $\sqrt{2}$ times the length of the motor lever. Referring to Figure 4, it can be seen that, starting from the vertical down position of the tilting motor arm, one half turn of the motor will raise the antenna tilting lever, via the connecting rod, from the -45 degrees to the +45 degrees position, thus turning the beam from vertical to horizontal. The next half turn of the motor returns the beam to its initial position. Due to the vertical speed characteristic of the tip of the motor lever there is slow acceleration, rapid intermediate lift and slow deceleration; this virtually eliminates inertia effects on the beam. (See Figure 7).

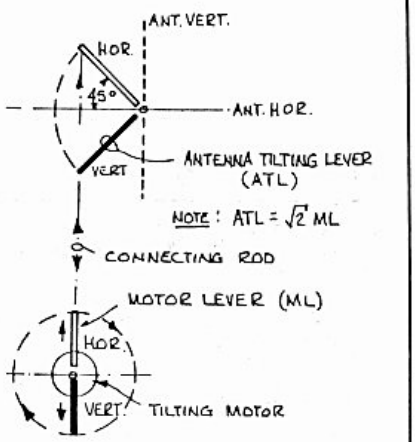

Figure 4: Tilting Scheme.

The construction of the masthead box depends on the dimensions of the motor used. Figure 5 shows the box I made up. It is using 1.6 mm A1 sheet and self-tapping A1-compatible screws. Drain holes are drilled in the bottom shelf which is fitted with two panel mounted coaxial sockets, for the feeder and antenna cables. As an after-thought, I also fitted an on/off switch to cut off the DC supply; this proved to be invaluable during installation and testing, saving many trips between shack and tower — 30 metres each time.

Now, set the timer, by means of the 100k adjusting pot, to allow the tilting motor to do exactly one half turn. This is done on the bench, using the proposed 12 volt supply and a short length of coaxial cable between the control box and masthead box.

You can now fit the masthead box to the mast, fit the connecting rod — I used six millimetre A1 tubing — and adjust the motor box position so that both the motor lever and the antenna tilting lever are aligned as shown in Figure 4, with the antenna in the vertical position. The first push on the automatic switch will then turn the motor one-half turn, tilting the beam 90 degrees into the horizontal; the next push will return it to the vertical. A small amount of over or under travel will not substantially affect the beam position until after several operating cycles. As a matter of interest, 30 degrees over-travel of the motor will move the antenna only seven degrees off the vertical. (See Appendix).

My motor came from a wrecked Torana. At five volts it takes about two seconds per half turn. If your motor requires a different voltage, refer to Figure 6. Check the current taken by the motor at that voltage to make sure that the relay contacts are adequately rated.

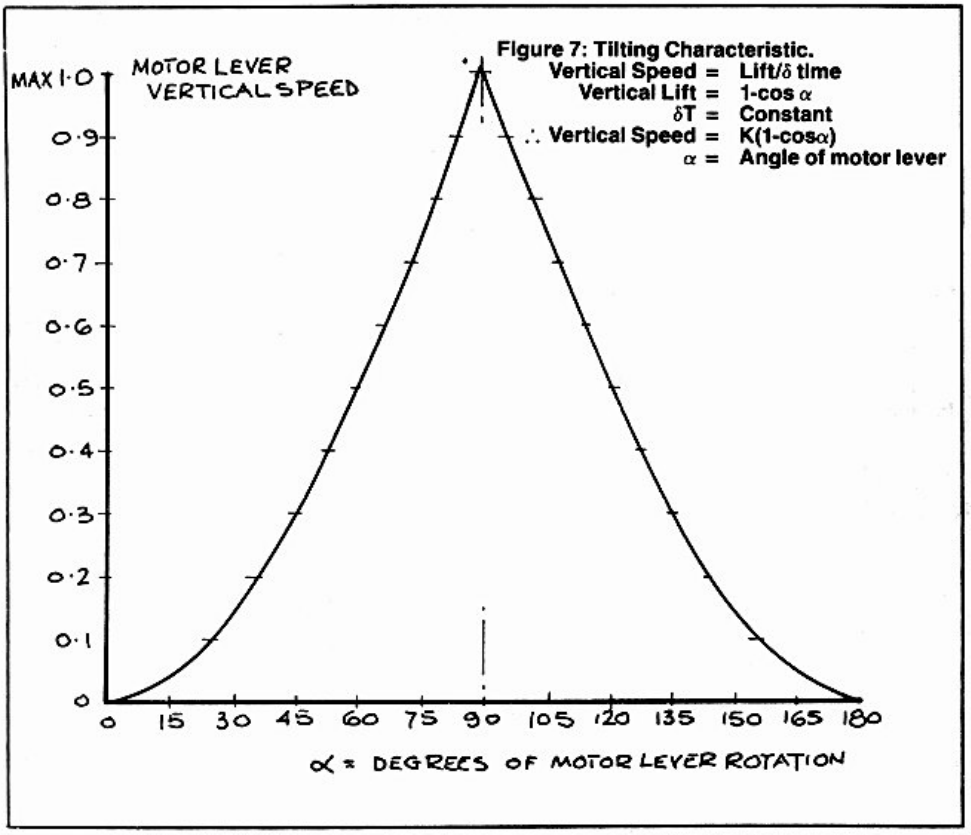

Figure 7: Tilting Characteristic.

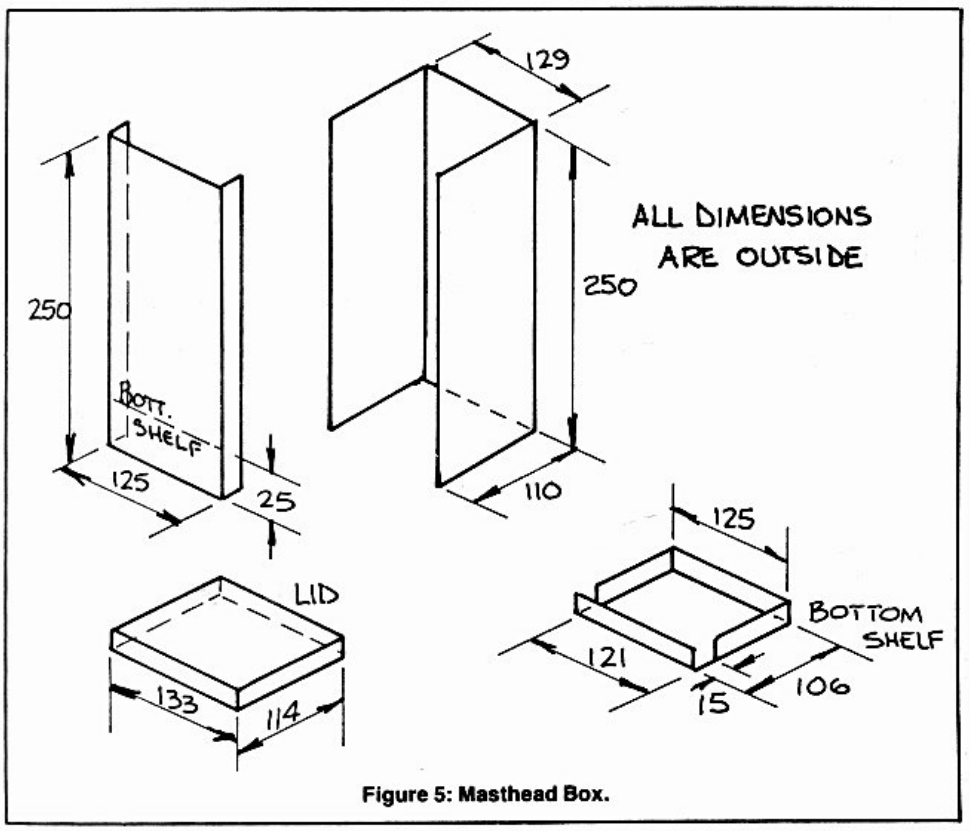

Figure 5: Masthead Box.

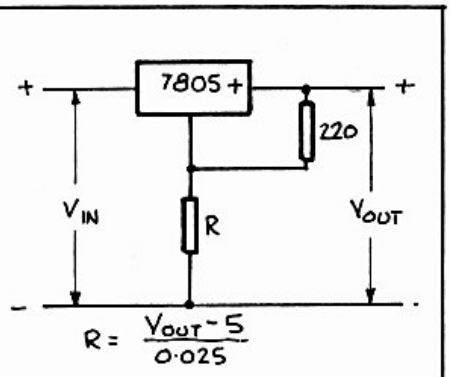

Figure 6: Increasing the Regulated Voltage.

V_{OUT}	6	7	8
R	40	80	120

The cost of the whole project — apart from the motor — was in the order of $30. The cost of an old wiper motor from a car wrecker's yard should be about $10.

In actual use, it has become evident that the motor speed, and hence the angle traversed by the motor lever, the antenna lever and the antenna itself, will vary somewhat with temperature. I have set the automatic timer for low temperature operation and use the manual adjustment, which is very accurate, to adjust the actual position on a hot day, if necessary. At night, when I cannot see the beam, the timing is quite accurate.

APPENDIX

Taking the length of the motor lever L_m as unity (1) the vertical lift of the end of L_m, due to rotation, equals 1-cos. The end of L_m will be cosα vertically down from the centre of rotation.

The connecting rod lifts the end of the antenna lever L_a also to cosα below its centre of rotation.

L_a must be two times L_m, ie $\sqrt{2}$. Therefore $\cos\alpha = \sqrt{2}.\sin\gamma$, where γ is the angle of L_a below the horizontal.

γ is therefore arcsin $\cos\alpha/\sqrt{2}$. The angle β of rotation of L_a from the -45 degree starting position (and with it that of the beam from the vertical) is 45 degrees $-\gamma$.

Table 1 shows the necessary calculations for angles α from 0 to 180 degrees. It can be seen that, as stated, a 15 degree over-run of α will cause only two degrees of misalignment of L_a and the beam, rising only to seven degrees for a 30 degree over or under run.

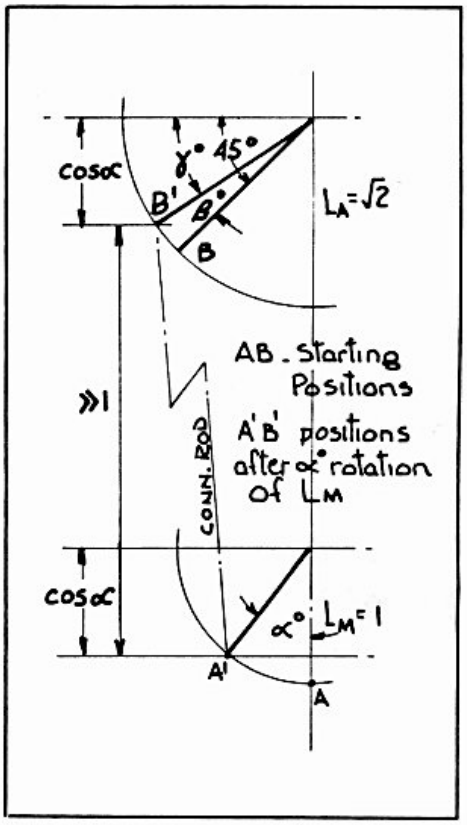

TABLE 1

α°	15°	30°	60°	90°	120°	150°	165°
cos α	.966	.866	.500	.000	-.500	-.866	-.966
cos α / 2	.683	.612	.354	.000	-.354	-.612	-.683
γ°	43.08	37.76	20.70	0	-20.70	-37.76	-43.08
β°	1.92	7.24	24.30	45	65.70	92.76	98.08

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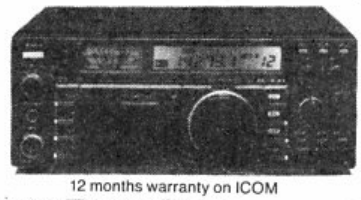

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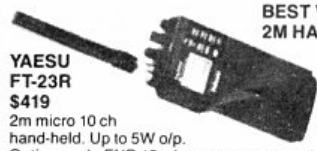

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TS-680 160-6m Transceiver **$1550**

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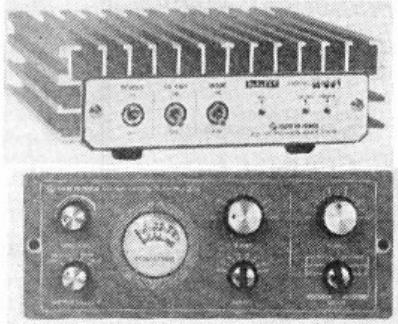

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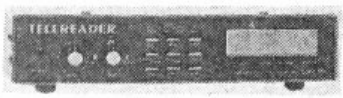

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It is not difficult to purchase or manufacture a broadband antenna — a standard 50 ohm artificial (dummy) load is a perfect example.

The above title may be subject to some debate, considering the range of antennas to be mentioned in this article. Perhaps the best definition of an ideal broadband antenna is one which exhibits a constant impedance over an infinite frequency range.

In practice we are generally unable to obtain constant, non-reactive load impedances, so we usually settle for perhaps less than 2 to 1 SWR at a nominal impedance — this relatively constant load is however usually only obtainable over a finite frequency band, (SWR bandwidth). On High Frequency bands, most amateurs are concerned with the range 1.8 to 30 MHz. For long distance contacts, the range 3.5 to 30 MHz, is satisfactory in most cases.

It is not difficult to purchase or manufacture such a broadband antenna — a standard 50 ohm artificial ("dummy") load is a perfect example. How far can one communicate on such an antenna? Hang a metre of wire on the load, and you do have an antenna that radiates, together with a low SWR. But how effective is it?

The antennas to be described are useful over all or some of the above ranges. I recently had occasion to review a number of *Wire Beam Antennas* (See October 1984 *Amateur Radio*), and a flood of inquiries revealed the need for a treatment of the present subject — also a number of close friends, wishing to manipulate as few band-changing knobs and controls as possible, sought my assistance with "tunerless" antennas. We are all aware of the almost universal use of 50 ohm output transmitters, and many are designed to "close down" when the SWR is greater than 2 to 1 — hence the impedance limits it is proposed to include in this article. These modern transceivers have adequate harmonic suppression due to inbuilt bandpass filters, and the further need for an ATU is somewhat reduced.

1. TERMINATED TWO WIRE FOLDED DIPOLE (T2FD)

GENERAL

First aired for amateur use in 1951, this was perhaps one of the earliest broadband antennas introduced to the amateur scene — condemned by many as a "lossy" type, few were willing to consider it seriously, as nothing was really gained — an antenna tuning unit was still required as it used 300-600 ohm open wire line.

It appeared again during the 1970s in commercial work, where a 50 ohm to 300 ohm "balun" transformer gave a constant load over a large part of the high frequency range, for use in the Outpost Radio Service, Fixed and Mobile services, etc. Its use as a sloping antenna running from the top of a "free-lite" or windmill tower, to a convenient fence post was popular (and still is). See Figure 1.

DIMENSIONS

The overall dimensions appear to have been universally accepted as:

$$\text{Total length of wire (L) in metres} = \frac{100}{f(\text{MHz})}$$

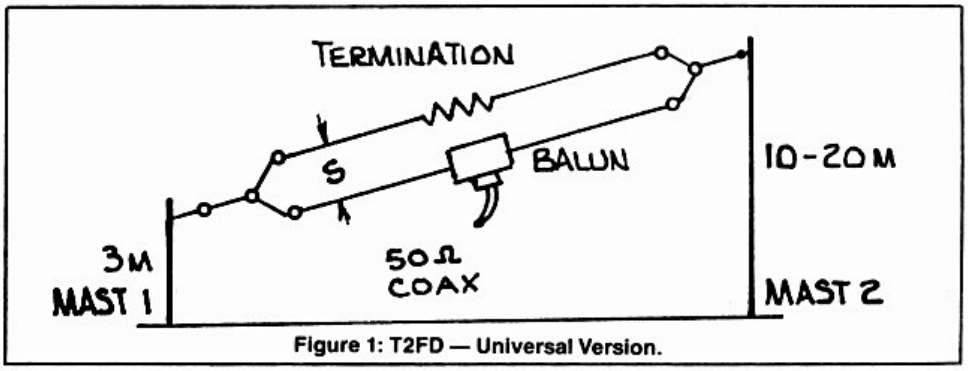


Figure 1: T2FD — Universal Version.

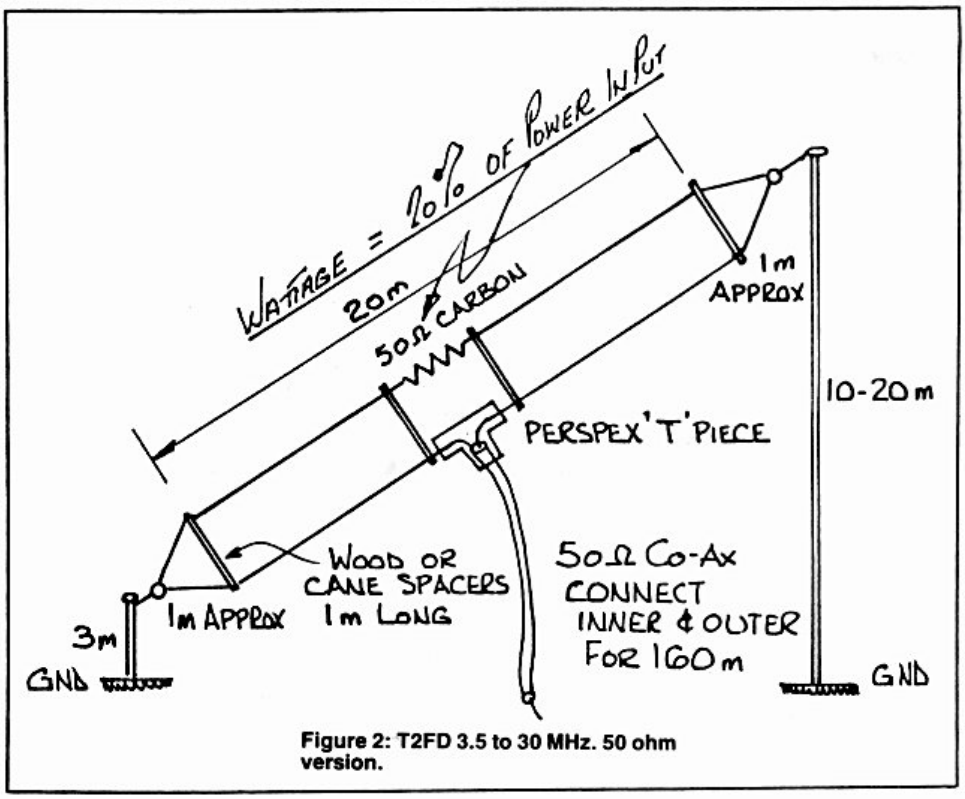


Figure 2: T2FD 3.5 to 30 MHz. 50 ohm version.

$$\text{or in feet, L} = \frac{328}{f(\text{MHz})}$$

$$\text{Spacing (S) in metres} = \frac{3}{f(\text{MHz})}$$

$$\text{or in feet, S} = \frac{9.84}{f(\text{MHz})}$$

In the above, f = lowest frequency required; eg for 1.8 MHz L = 55.6m, S = 1.7m (182 feet, 5 feet 6 inches).

The termination, located opposite the feed point, is historically 300 ohms to 600 ohms. This appears to be related to earlier line impedance standards, and a belief that the antenna could be related to a "Squashed Rhombic", which also had the 600 ohm termination.

An article using a 50 ohm termination on such an antenna appeared some years ago, and there is no reason why such a value should not be used — feedline matching would be much simpler. See Figure 2.

The use of "balun" feed is generally indicated, although a sloping wire over ground is a doubtful "balance" to feed to. Direct feed via 50 ohm coaxial cable, with a 50 ohm termination should produce acceptable results.

2. A "RHOMBI-QUAD" ANTENNA

An antenna concept for situations where the use of high masts is precluded, has become popular in various areas — this consists of a horizontal loop, usually square, raised above fruit trees, etc, by short masts, and fed in a number of ways — either at a corner or in the middle of one side.

Two such constructions of which I am aware are praised by their owners as good for noise reduction, and suitable for DX net operation. The configuration may be a continuous loop, open circuited opposite the feed point, or terminated as shown in Figure 3.

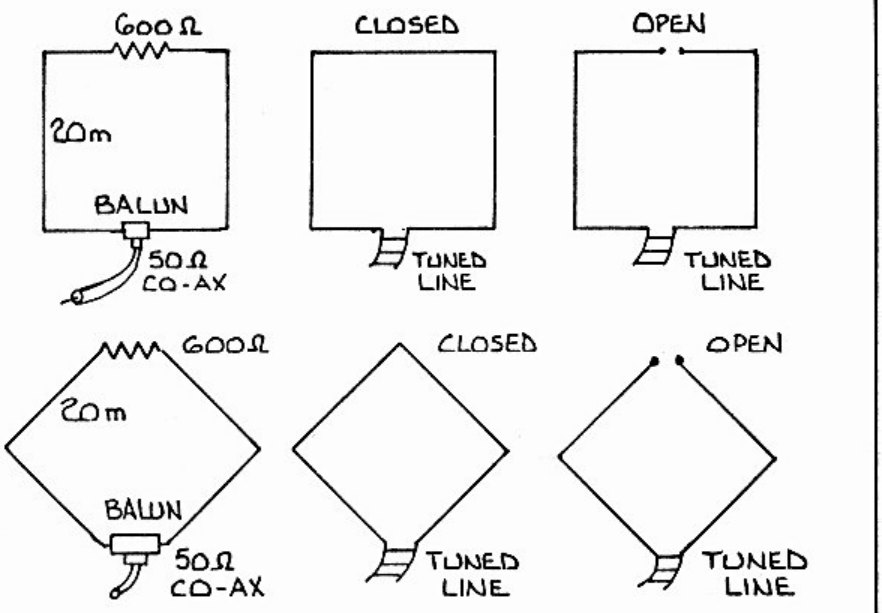


Figure 3: Rhombi-Quad.

Preferred lengths seem to be 20 metres on each side, but shorter lengths should not be discounted. The use of the terminating resistor permits broadband operation, and such an antenna could well be the starting point for suburban experiments in broadband antennas. If unterminated, an ATU is required.

As the antenna is horizontal and fractionally above ground, it presumably radiates vertically upwards — the thought that it is a miniature "rhombic" might be discarded. Additional wire in the form of a grounded loop set up under the antenna loop may enhance its operation by providing a reflector surface.

A termination of 750 ohms was used in the source article — a matching balun feed to this may be awkward — try it with a 200 ohm or 600 ohm termination, for which balun details are generally available.

3. CONICAL MONOPOLE AND BICONICAL MONOPOLE

The use of discone antennas on VHF and UHF bands for wide band coverage is appreciated by most enthusiasts. The benefits of lower than horizon radiation patterns, and apparent gain over a dipole on some frequencies, are valued.

When such antennas are considered for High Frequency use, the size of the structure may at first be frightening, and placement of a large diameter disc on top of a cone would be a hopeless engineering project. The solution is of course, to invert the whole array. This results in a radiation lobe just above the horizon, (typically 30 degrees) with the resultant benefits of DX performance.

Such an array, made of wire with perhaps 8-12 sections, and using ground level radials, is known as a Conical Monopole Broadband operation is obtained with low impedance feed at the base; however the bandwidth may not be adequate for all purposes. In practice, a second "cone" is mounted, inverted, on top of the original, to assist in extending the frequency range to a lower limit.

Conical monopoles are used extensively in marine, and broadcasting reception by professionals — additionally such an antenna, due to its omnidirectional property, can be actually calibrated and used for field strength measurements, at Monitoring or Receiving stations. Its main benefit is the need for only one pole on which to mount it.

Some suitable construction information can be found in the ETI and AR references. The main benefit in my observation is the ability to achieve wide band coverage over say 4 to 30 MHz, *without* the use of loading resistors. Thus it is totally efficient and dedicated to radiating energy on all frequencies in that range. If a higher SWR can be tolerated, a Biconical Monopole only seven metres high, could be used efficiently and effectively from 3.5 to 30 MHz. If 50 ohm coaxial cable is fed direct to the base insulator section, you could expect satisfactory results. In tropical situations with heavy static buildups, I have found the shunting of the base insulator with a five megohm resistor assisted greatly in reducing the interference from this source.

Some models are marketed for professional use, but prices may be out of reach of the amateur. An economical approach may be to construct one of those in the ETI or AR references.

4. "INVERTED VEE" BEAM ANTENNA

The configuration I speak of under this title is the low, obtuse angle, terminated beam, that looks somewhat like a half rhombic turned sideways. That, in fact, is exactly what the antenna is.

Consider a rhombic turned through 90 degrees on its main axis, and perhaps a ground reflection to fill in for the "missing" side.

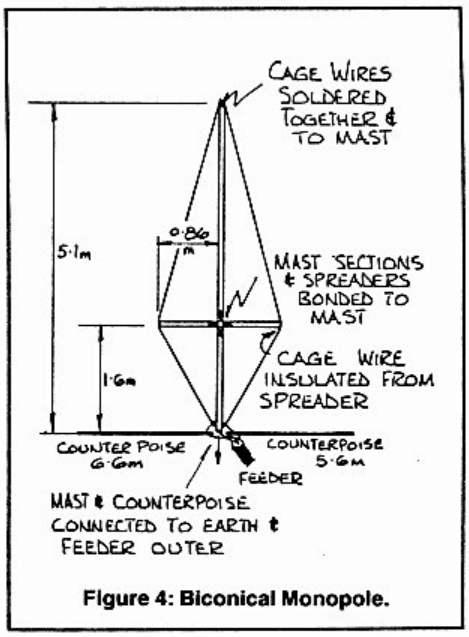


Figure 4: Biconical Monopole.

In its practical application I have seen it used effectively for point to point circuits over moderate distances. I first encountered it at Macquarie Island in 1952 where it had been used for contact with Australia since 1948. This one was 25 metres high at its apex and 100 metres on the base line. See Figure 5. The terminating resistors were interesting — a selection of carbon filament "capped" incandescent lamps mounted in series/parallel to give a 400 ohm resistance. The mean output of our AM/CW transmitters was only about 800 watts, however enough was dissipated in the load to give it a moderate glow — imagine wandering around the ANARE base on a dark night with a "ghost" light flickering on and off!

The direction of radiation was along the line of the wire towards the termination, with a gain of about 6-10 dBi, depending on the specific frequency. It was used over a 4 to 30 MHz range, but as it was fed with 400 ohm line by a complex balanced/unbalanced pi-coupler network of an AT20 transmitter, I was never at that stage interested in its SWR.

Later, back in Australia, I found myself working for a PMG monitoring station, and found exactly the same antenna in use for listening to overseas broadcasts — the long open wire line, adjacent to other similar lines never impressed me, so some years later, when responsible for the operation of the same station, I arranged to have the antenna fed via coaxial cable and a 400 ohm to 70 ohm

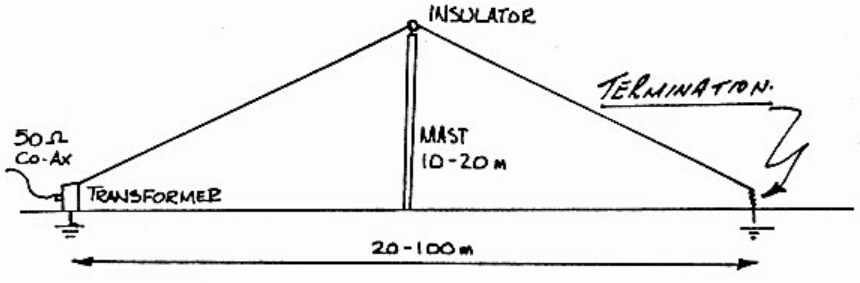


Figure 5: "Inverted Vee" Beam.

transformer. The improvement, particularly its improved rejection of "static" noises from nearby transmitters was worthwhile.

I had occasion, when establishing a monitoring station in Port Moresby in 1958, to revert to the same antenna for multi-frequency listening — comparing it with the many dipoles on co-sited communications receivers, I found it to be less prone to some forms of thunderstorm static than the dipoles. I had my own version at home for a short period, and used it mainly for scheds with Australia, where its 14 to 30 MHz performance proved most acceptable.

The antenna has been perpetuated for amateur use by Barker and Williamson, who are (in recent issues of *QST* and *Ham Radio*) advertising their version for 1.8 to 30 MHz use. An advertisement in *CQ*, November 1973, shows a price tag of $149.50 — it must obviously have some useful properties.

I suggest the configuration in Figure 6 for maximum effect on HF amateur bands — the load should be of about a quarter to a third of the transmitter output power and of 400 ohms, non-inductive (resistive). The input transformer may be wound on a bundle of ferrite rods or on an HF toroidal ferrite, with an appropriate turns ratio to give 50 ohm or 75 ohm match to a 400 ohm load. Note, this is not "balun". See Figure 6. Earthing should be via an electrical stake at both ends, and, if available, a length of wire (old coaxial braid) should be used to bond the stakes together.

GROUND SYSTEM

In my own home experiments I have laid out old coaxial cable on the ground using the copper braid for bonding to the termination tower and the feed points, with success. In the commercial versions mentioned above, no earthing other than a few close spaced stakes into the ground were used, the soil conductivity being reasonable in all cases.

I have been recently provided with some text book extracts which show a recommendation for ground radials, over 180 degrees at both ends of the Vee — these radials covering the two quadrants in the direction of the main lobe.

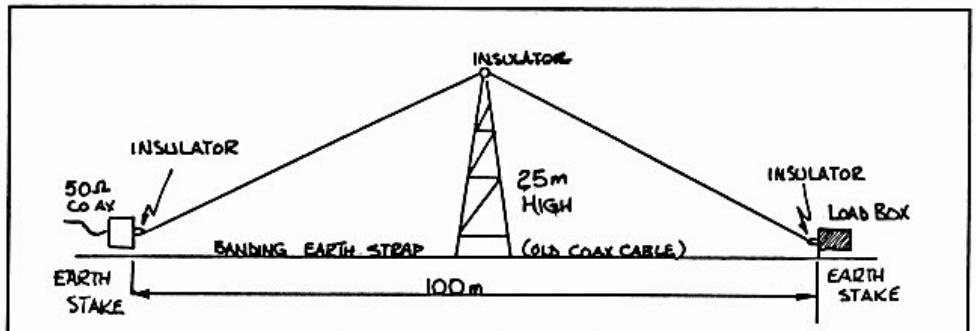


Figure 6: Alternative "Inverted Vee Beam".

5. TRAVELLING WAVE DIPOLE

This antenna has been featured extensively in overseas and Australian publications. It is marketed in Australia by AEA, however suitable dimensions for amateur construction were given in *Amateur Radio*. Reference to this source article should give further information. The antenna is used extensively throughout Australia in commercial installations where coverage of the whole HF band is required. From the bus stop where I board for my homeward journey each night I can see three such antennas at different locations on tops of nearby buildings. Suitable dimensions are shown in Figure 7. These were extracted from *Amateur Radio*, 1983.

The antenna is not too elaborate, however some care may be necessary in "rigging" it, as a twist in the wrong place may be difficult to remove! The terminations used are described, and from various articles appear to be non-critical.

Radiation patterns and gain on various frequencies have not been mentioned in any local papers — Ian Wall of *Codan* recently drew my attention to an article in a German publication of 1966(!) where both horizontal and vertical patterns are plotted. These show essentially unidirectional horizontal patterns to 10 MHz, and four leaf clover break ups at higher

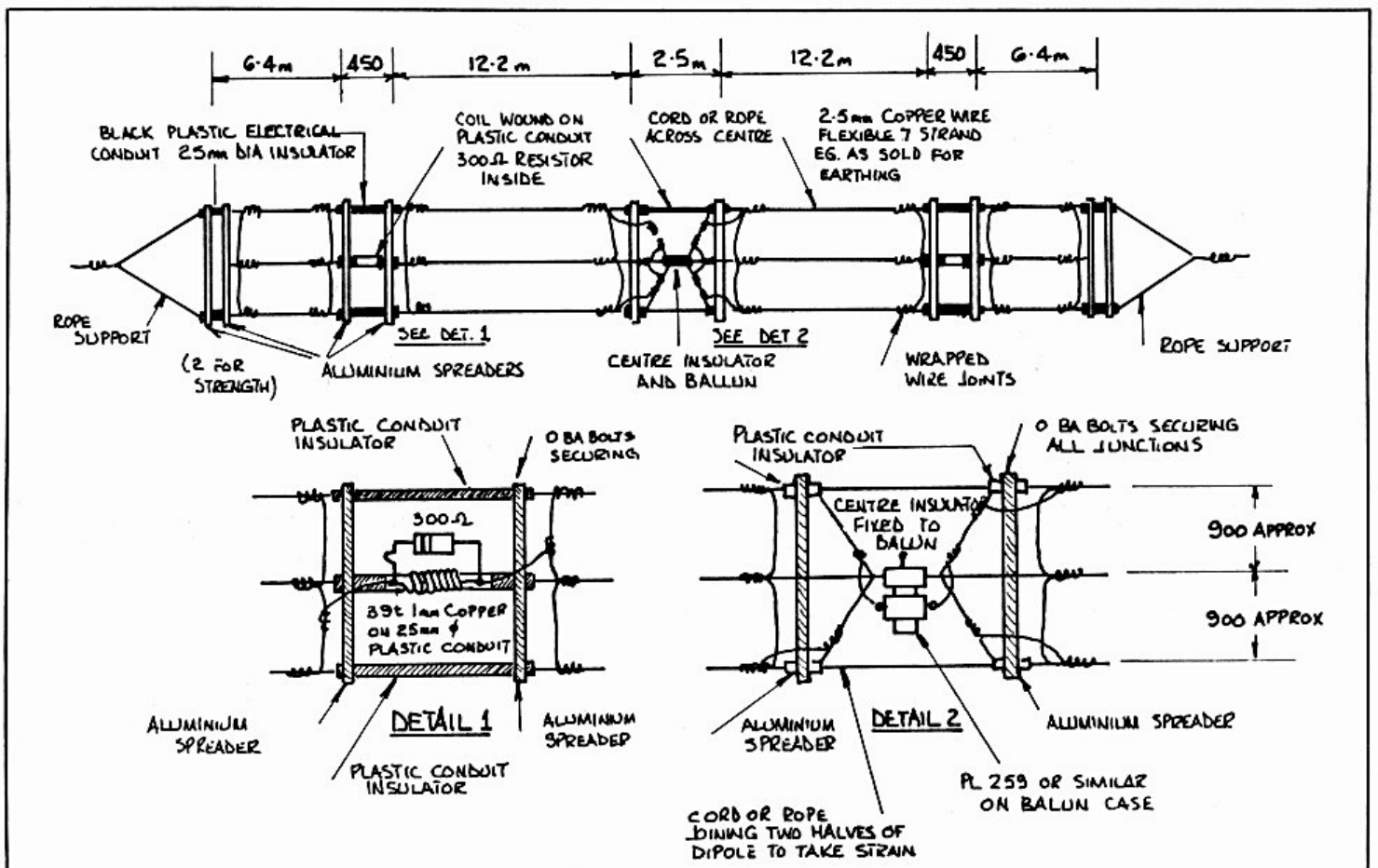
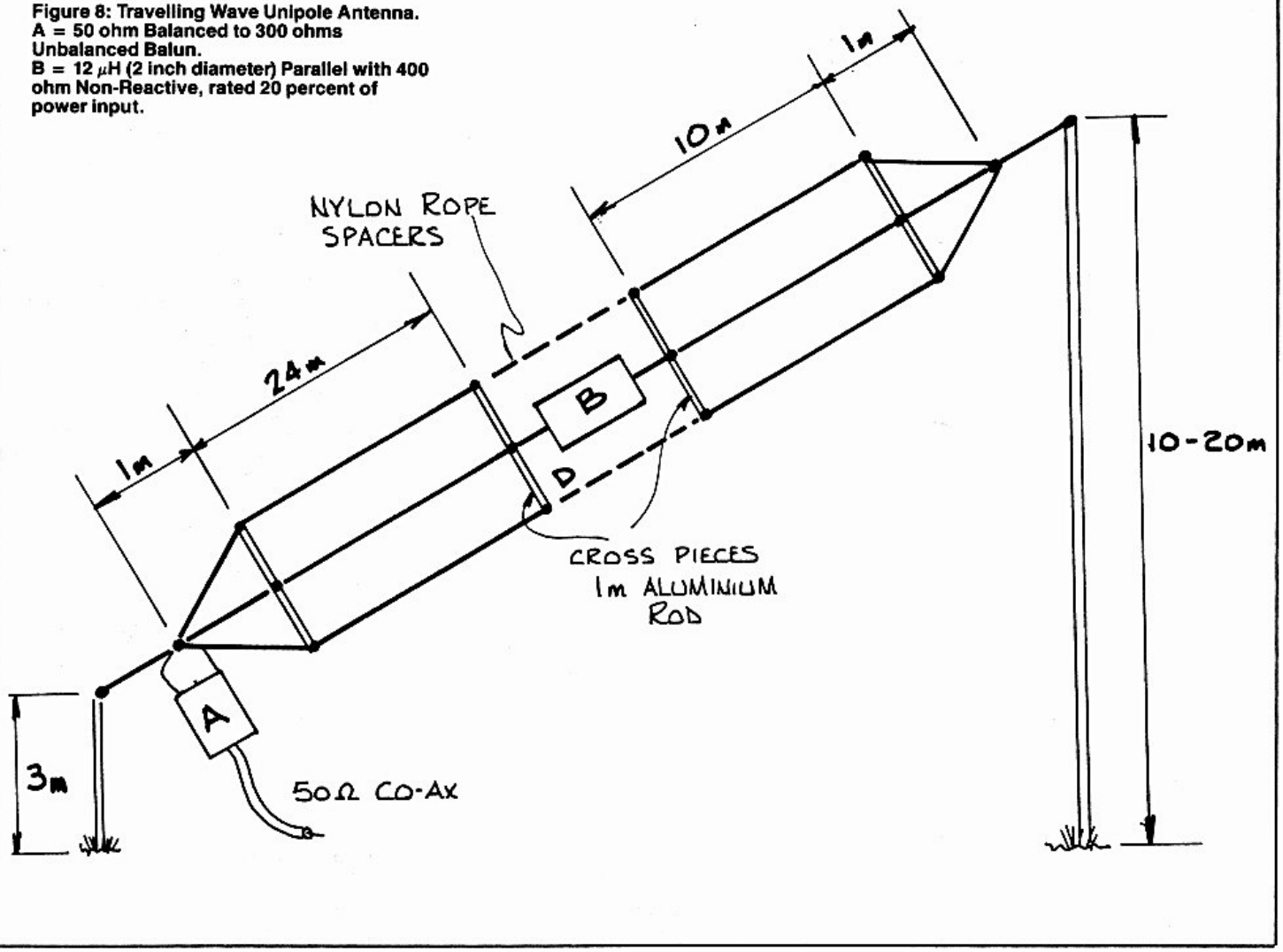


Figure 7: Low-Cost Broadband Travelling-Wave Dipole (Construction Details).

Figure 8: Travelling Wave Unipole Antenna.
A = 50 ohm Balanced to 300 ohms Unbalanced Balun.
B = 12 μH (2 inch diameter) Parallel with 400 ohm Non-Reactive, rated 20 percent of power input.



frequencies. Vertical radiation is high to over 5 MHz, however is 40 degrees at 10 MHz and 25 degrees at 15 MHz. In general, a good all-round aerial for inter and intra state contacts, as well as long distance on 10 MHz upwards.

6. TRAVELLING WAVE UNIPOLE

This antenna must be one of the most versatile in use in Australia. Developed during the boom period for commercial SSB conversion, two Australian companies, *Codan* and *AEA* have both put much practical design and knowledge into its construction.

It is essentially a sloping half section of a "travelling wave dipole". Designed for erection on outback properties, with a minimum of supports, the aerial is usually rigged from one moderately high tree, mast or tank stand, to a short mast, three metres high to clear moving vehicles, tractors, persons, etc.

Frequency coverage for less than 2 to 1 SWR is about 2 to 15 MHz, which is adequate for its design purpose. Mast heights recommended are in the order of 15 metres and three metres, and a separation of 20 metres. Is application to amateur radio portable operation is obvious.

An amateur version is fact was described in a 1960 issue of the WIA SA Division Journal, and is reproduced in Figure 8. Note the mysterious termination is only parallel resistance and inductance.

7. HIGH FREQUENCY DELTA ANTENNAS

Low angle radiation antennas have always been the goal of DX operators on amateur bands./ To achieve this on 7 MHz and below has been a difficult proposition for most; those that do achieve it usually find some degradation in their close-in signal strengths, and are sometimes confused about the overall results.

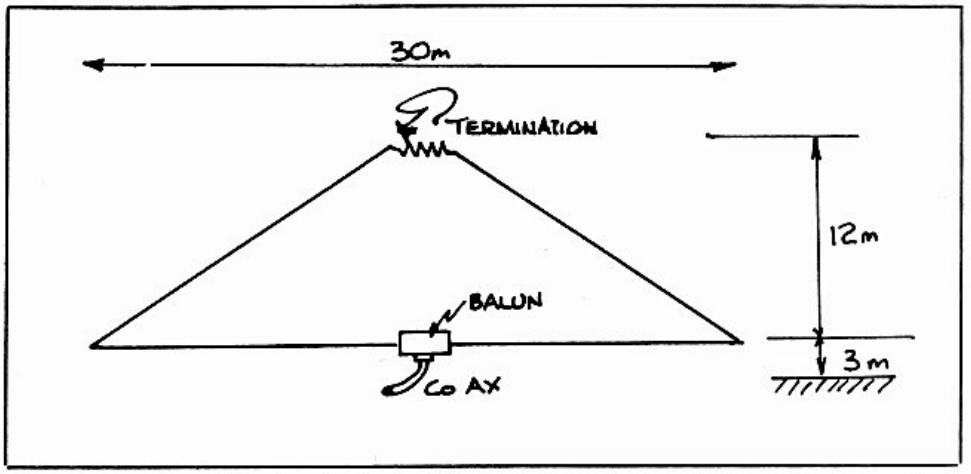
For coverage over short distances, 100-500 kilometres, it is better generally to utilise vertical incidence propagation arrays. This is in effect a total abandonment of the low angle radiation concept, with a deliberate use of the ionosphere to "spray" the RF back towards the earth surrounding the transmitter. Vertical incidence ionosphere sounding is carried out in a number of locations through Australia to determine heights of the various ionosphere layers — signals sent vertically towards the ionosphere on a band-sweeping transmitter, are reflected back to earth by various layers at specific frequencies. Some frequencies are actually absorbed and not reflected. The vertical radiation from an antenna does not form a narrow beam, rather a broad "spray", hence it covers the ionosphere over a large radius above the antenna — the "spray" then is reflected back towards the earth over quite a sizable area, depending on the angle of contact with the ionosphere, and the instantaneous surface contour of that layer.

The method is used extensively for local area broadcasting on High Frequency — I've seen it used successfully in Papua-New Guinea, and more recently observed its introduction at stations in Alice Springs and other Northern Territory towns.

For radio communications use it has become a practical antenna for HF mobile use in country and outback property and business systems — the limited range of VHF/UHF has made the HF mobile systems more practical, and to obtain coverage beyond ground wave limits, a variety of successful and practical "Vertical Incidence" arrays have been developed. Frequency range can be extensive, however a 2 to 10 MHz coverage is normally adequate. In amateur work, with some tolerance, a system could be used over the whole HF band.

In this respect, the radiation of higher frequencies vertically above ground will, at times, result in direct penetration into the ionosphere, and thus loss of communications — an amateur should have a lot of fun experimenting with this type of antenna, particularly investigating its DX usefulness over the whole HF band.

A commercial model available in Australia from Antenna Engineering Australia Pty Ltd utilises



a two wire cage assembly where the horizontal and sloping sections consist of dual wires, connected at each end, but spread apart in the centre. I am not sure what results from this, other than suspecting it maintains the SWR below 2 to 1 on certain frequencies.

The use of this system for reliable local contacts on 80 and 40 metres is recommended — performance in base to mobile contacts should be improved over a dipole, and for point to point contacts over paths below 1000 kilometres, an appreciable improvement should also be noted.

8. TERMINATED LONG WIRES

Amateur experiments with unterminated long wire antennas can be most frustrating and inconclusive — my own efforts in various locations and in field days, have led me to conclude that a resonant dipole, (or two), may sometimes be more effective. I have also concluded that the reason for the apparent anomalies come from the following.

1 Useful lobes (major and minor) are never in the direction of the desirable or active DX.
2 "Nulls" between lobes are in the direction of the wanted DX.
3 The main lobes, being in the general line of the wire, cover some 60 degrees of azimuth leaving the minor lobes and associated "null" to cover the remaining 300 degrees.

Hence, before one constructs a long wire antenna, it is worth spending some time and effort establishing:

1 Angles of major lobes. (See Figure 10.)
2 Angles of "Nulls". (See Figure 11.)
3 Bearing of preferred target areas.

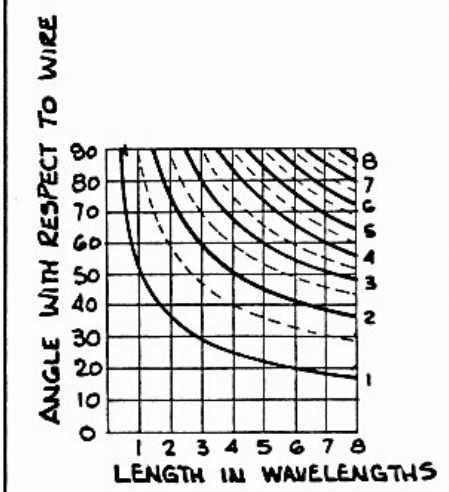


Figure 11: Angles at which radiation from long wires is maximum (solid curves) and zero (broken curves). The major lobe, No 1, has the power gains given by Figure 1. Secondary lobes have smaller amplitude, but maxima may exceed the radiation intensity from a halfwave dipole.

At this point I should mention that a long wire, in this context, could be defined as more than two wavelengths — the term is purely relevant to the specific circumstances, available space and frequency bands of use. A 40 metre end fed antenna in a suburban yard might, for example, be a "long wire" for 10 metre use, but is only short for 80 metres.

Some useful calculation of where one can expect to find the minor and major lobes, and the position of nulls, may be assisted by charts in the *ARRL Antenna Book*. My 1982 issue, page 7-1, Figure 1 gives the angles of the four major lobes, and their gain in dB over a dipole (see Figure 10). An interesting observation is that for lengths over six wavelengths the angle holds close to 15-20 degrees to the wire — this means no matter how long the wire becomes, radiation is never maximum in line with the wire. This lacks conformity with practical advice given by old-timers of "point it to the place you wish to target, and you can't go wrong". Be warned, this may be false guidance. Even to terminate the long wire will not destroy this radiation pattern, it will only give the antenna a constant impedance (broadband).

In Figure 2 of page 7-2 of this ARRL reference, a chart guides us to the angles at which we find other "minor" lobes, and most important, the angle at which the zeros or nulls occur (se Figure 11). I cannot stress this last point sufficiently — don't spend time and money on long wire antennas or their derivatives (Rhombics, Vees, etc) without giving some consideration to the fact that, to obtain gain, power had to come from somewhere!

Another interesting alternative is to "tilt" a long wire — a wire's radiation is improved if it is tilted at the same angle as the main lobe. This makes it more directional towards the lower end of the wire — radiation in the reverse direction is reduced. See Figure 12.

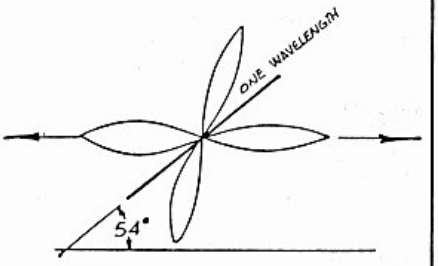


Figure 12: Example of how tilting antennas aligns major lobes to a more useful angle.

To feed an undetermined long wire we must use resonant feed lines, or locate a low impedance point for direct feed of coaxial cable — if this is done, use on other random frequencies is precluded. Some useful radiation patterns are given in Pat Hawker's (G3VA) *Amateur Radio Techniques*, Ed 7 p 296, for anyone wishing to follow this method. The "Slewing" of patterns for end, centre, and off-centre feed is very interesting. If a wire is terminated, it is only necessary to match a coaxial line to the termination impedance.

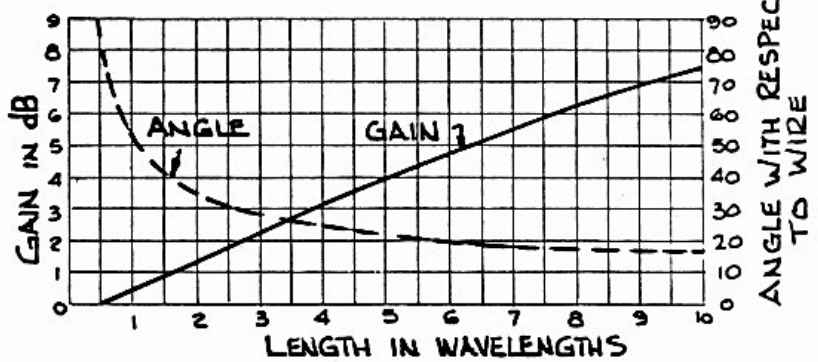
Hence to target a particular area for a terminated long wire we must ensure all the above parameters are considered.

What about using multiple, sloping, terminated long wires, held up by a central tower or pole? If you do this you have one of the most practical HF direction finding systems possible.

In fact, such an array is known as a "Baldock System" and used in the UK and Australia for just that purpose!

The configuration is simple — two long terminated sloping wires 15 degrees apart, are in combination to give selective major lobes every 30 degrees around the compass — hence 12 such wires would, by switching in pairs, give a positive bearing ever 30 degrees. By use of the property of the single wire, and readings on adjacent wires, bearings to an accuracy down to five degrees are common

Figure 10: Theoretical gain of a long-wire antenna over a dipole as a function of wire length. The angle, with respect to the wire, ar which the radiation intensity is maximum also is shown.



with this system. Its use as a world-wide DX transmitting antenna for 1.8 to 30+ MHz is wonderful — so is its cost!

9. TERMINATED "VEE" BEAMS

In Part Four I covered the inverted "vee" beam — traditionally "vee" beams have been horizontally polarised and made up of two long wires, using both unterminated and terminated conditions. An unterminated vee requires a tuning unit for adjustment to specific frequencies — only when it is terminated will it become broadband, and, of course, both legs must be terminated. This application was mentioned in Part Eight, when the "Baldock" DF system was discussed. (See Figure 13 (a)).

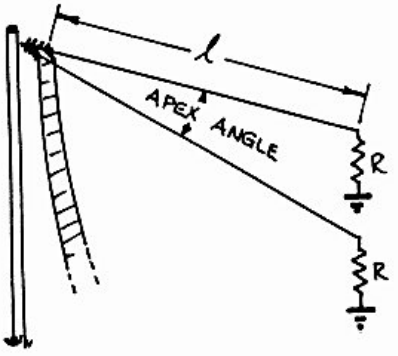


Figure 13a: The sloping Vee Antenna.

Certainly two terminated long wires in the form of a "Vee" can give a simple and reliable beam, where the same direction is required throughout a long period of time. Amateur use may be precluded, as you never really know which direction you will wish to work to next.

The antenna is most useful for specific directions — from the ARRL tables, the most desirable angle for maximum gain is 30 degrees (15 degree lobes reinforce) — leave the terminations off for bidirectional use.

Again, as for long wires, there is an advantage in sloping the wires toward the same direction. Thus with two sloping, terminated wires, quite large gains can be experienced over a 3 to 1 frequency range. An eight wavelength terminated "Vee" would have in the order of 10 dB gain over a dipole.

The height of a long wire above ground is also of interest — the resultant wave angle is influences along the lines shown in Figure 14.

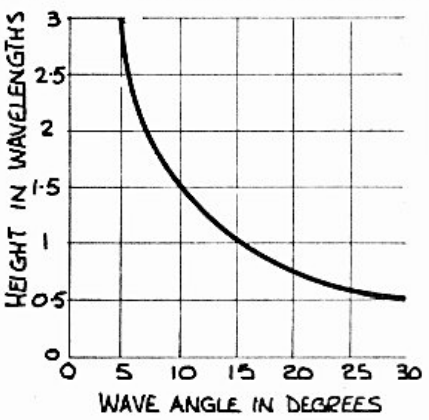


Figure 14: Antenna Height to be used for securing maximum radiation at a desired wave angle. This curve applies to any type of horizontal antenna.

As is obvious, few of these antennas could be erected in a suburban allotment for 3.5 MHz, etc, however, for frequencies 20 MHz and above, something practical may be possible.

In all terminating arrays, ground conductivity plays an important part — the laying of extensive radials is of value. The use of old coaxial cable as a "return" earth, laid on the ground between termination and feedpoint is quite acceptable. "Doubtful" coax is always appearing at "buy-sell" evenings at bargain prices and its use for ground radials or mats for any antenna is encouraged.

With respect to the termination, it is usual with the "Vee" to terminate each leg to ground through a 400 ohm load.

I have noted in the Product Information for the AEA Model 4131 HF Sloping Triangular Antenna, the innovative approach to the termination — in this model, each distant end of the "Vee" is continued across the base of the triangle and at the centre, a single load/termination is used (see Figure 13b).

I think this is the antenna those farmer/amateurs with an acre or two of gum trees, may have been dreaming of for some time. It is simple, non- critical and providing symmetry is maintained, you should not go wrong. The termination resistance should not be critical, and if you wanted to reduce it to 200 or 300 ohms, some useful results should be evident. Make sure you point it at the desired target or you may not be very pleased — see comments made in Part Eight, "Terminated Long Wires".

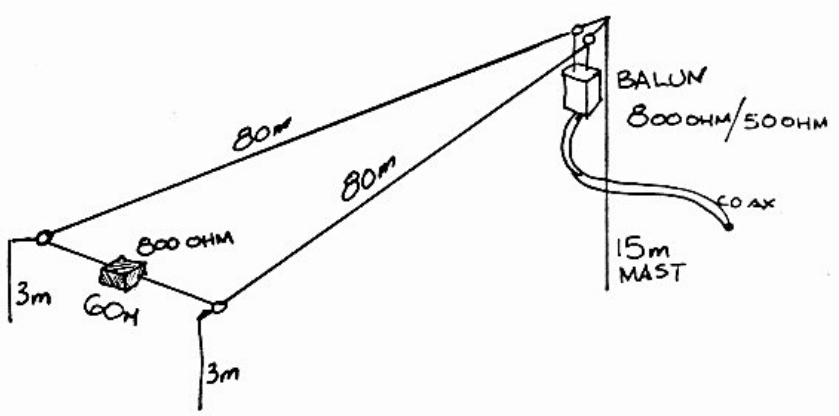


Figure 13b: Vee with termination similar to AEA 4131. (Note: Dimensions and terminations arbitrary values).

10. RHOMBICS

Unfortunately, this very valuable antenna is usually put in as an appendage to the "broadband" articles for amateurs. This is not because it is not used very much, but because its description and dimensions can become very prolonged. Basic construction is shown in Figure 15.

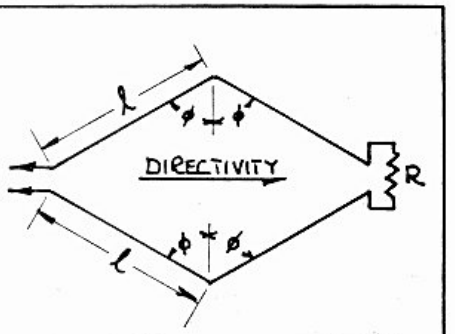


Figure 15: The nonresonant rhombic antenna.

I like the Rhombic — in essence it is two Vee beams back to back to give yet another 3 dB gain. I have been an admirer of the antenna for 40 years, and use every opportunity to listen on one, or use it, or photograph it. I have collected many "Rhombic Farm" layouts, and investigated a number of radio frequency interference problems with radio communications systems using them. Unfortunately, I have never owned one, but through the co-operation of my friend, Stuart Millowick VK5MS, have had recent amateur involvement with one. Another friend, Ray Naughton VK3ATN, continues to use these antennas for HF and more historically, his first EME successes were on 144 MHz with this antenna.

For the purpose of the present article I can only refer the reader to some of the literature in amateur magazines and text books I have listed. Some observations on amateur Rhombics that may be of value are:

1 The angles of the wires are fixed, but as you vary the frequency of use, the angle of the main lobes varies (see *ARRL Antenna Book*). There is only one frequency where the lobes totally reinforce one another to make a single major lobe — on other frequencies some distortion of the major lobe is evident but symmetry remains. (Refer to Figure 16).

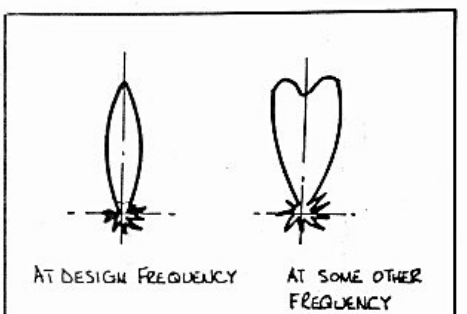


Figure 16: a. At design frequency. b. At some other frequency.

2 Vertical angle of radiation is controllable (or predetermined by fixed dimensions), hence some experience and appreciation is needed.
3 The nulls between lobes are very sharp and front to back ratios may be confusing under some conditions.
4 Directivity is very good and predictable — antenna may appear useless in all but the target direction.
5 It may be reversed by using a feedline from each end to a central point, where, by switching, either end may be fed and/or terminated.

At VK5MS, experiments continue on all bands, but the following Rhombic is presently giving excellent results. (See Figure 17.)

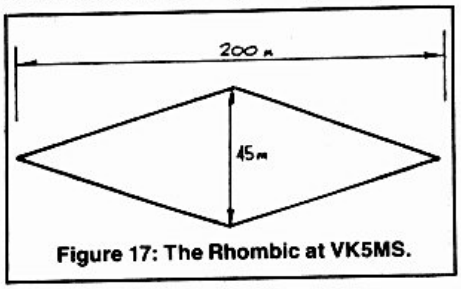


Figure 17: The Rhombic at VK5MS.

The antenna in Figure 17, at 33 metres, has been compared with a five element Yagi on 14 MHz at the same height. In the design direction it has gain in excess of 6 dB over the five element. This same five element has a gain of 6-8 dB over a comparison TH6DXX at 33 metres.

The Rhombic thus shows 12 dB above a TH6 when terminated and operating on the long path to Europe. This is an unbelievable figure academically, but when you see S-meters indicating these worthwhile figures, you realise that lobe angles vary as do angles of arrival, some latitude is necessary!

The amazing thing about these grand aerials is that overseas stations hear you louder, more call you, and you sometimes have to ask for call sign repeats, due to the co-channel interference.

The Rhombic at VK5MS has been tried with its termination switched for short path working for specific experiments — instantaneous switching for front- to-back and gain comparisons has not yet been installed, however these experiments are continuing.

One interesting constructional feature about use of extremely long wires — it is sometimes necessary to erect additional support masts for the wires. Hard-drawn copper wire is essential, however it cannot be stretched to avoid sag without endangering support structures — it is better to reduce sag by the use of these additional masts. The need to go to extremely long wires may be impractical however, as the law of diminishing returns (narrow aperture misplaced nulls) may beat you ultimately.

11. LOG PERIODICS

I have had little personal experience with this antenna, but it keeps popping up so often in amateur and commercial use, it should not be omitted from this article. I saw my first in Rabaul in 1959 where it was used on point to point circuits. Later, I was able to listen on receivers connected to rotatable LPA 50 metres high. Even later I witnessed their use for High Frequency broadcasting from Radio Australia in Darwin. There was certainly a use established in broadcasting and commercial work, but in amateur circles little early development was apparent. The configuration of elements was physically impractical in some of the earlier designs, and the handbooks were slow to pick up the new antenna, restricting its application to VHF and UHF. Articles in the *ARRL Antenna Book* still promote most-complex mechanical monsters, for 13 to 30 MHz only.

The most practical articles that have come to my attention have been written by G E Smith W4AEO, in *Ham Radio,* from September 1972 through to May 1983. He seems fortunate in having a large number of tall trees at his disposal, and I am sure some VK amateurs may be in the same position — whether they are in the right location for a fixed beam to your favourite DX area, may be another problem.

Rotatable HF log periodics for amateurs became popular in Australia some years ago when ATN Antennas marketed a practical version running five or eight elements over the 13 to 30 MHz range. This range was developed to cater for the five bands we now have in this part of the spectrum — from all accounts they perform to specification.

Log periodics to cover 3 to 30 MHz do not exist — their practical design range is only up to just over 2 to 1 in the physical size an amateur can handle — VHF/UHF ranges of 3 to 1 are the subject of an article or two. Commercial larger sizes are usually 6 to 30 MHz, but the use of loaded elements and sophisticated boom and element construction is necessary, with as many as 12 elements in use.

Gain considerations are worthwhile — up to 9 dB over a 2 to 1 frequency range with an SWR less than 2 to 1 seems interesting! In my case, I would have to settle for the fixed wire types, using masts, towers or gum trees to support a maze of nylon cords and wires — W4AEO is extremely good practical reading on this approach, whilst the AEA Product Catalogue for the Models 638 and 690 provides interesting reading for those wishing to try a commercial version.

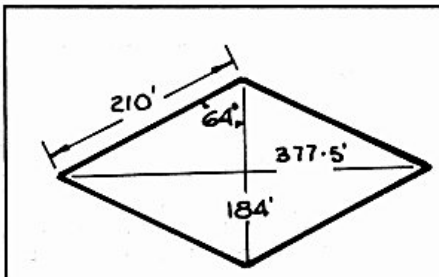


Figure 18: Rhombic antenna dimensions for a compromise design between 20- and 10-metre requirements, as discussed in the text. The leg length is 6 λ on 10 metres, 3 λ on 20.

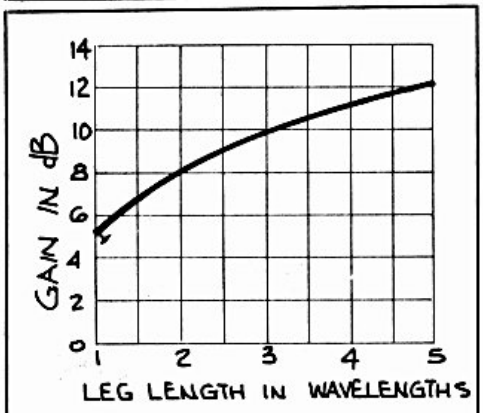


Figure 19: Theoretical gain of a non-resonant rhombic antenna over a half-wave dipole in free space. This curve includes an allowance of 3 dB for loss in the terminating resistor.

12. GENERAL

Numerous antennas utilised in commercial High Frequency communications are of interest to amateurs. Some appear from time to time in amateur literature, but few venture to develop their own versions, usually due to a lack of constructional information. I have attempted to list as many sources of practical information as possible, however, once the concept is appreciated, most amateurs should be able to some up with suitable construction techniques of their own.

This article was first presented as a lecture to the South Australian Division of the Institute in early 1986 and later to the Naracoorte Amateur Radio Club. It has been video taped and is available from the WIA Video Library run by John Ingham VK5KG. I strongly recommend this for club lecture nights.

I thank also Ian Wall of Codan and Ian Wade of AEA for their helpful comments and permission to mention their products. The Editor also should be praised for his patience at the long time he has waited for the manuscript!

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Multiband Exponential Antenna (AR Nov 1982)[1]
Andrew "Spiracone" advertisement (Communications International May 1986)
1. See Figure 4.

4 INVERTED VEE
1. Multiband End Fed Inverted Vee (AR Dec 1986)
2. Travelling Wave Antenna for "Radio Antenna Engineering"
2. Vertically Polarised Transmission (— Edmund A Laport)
3. Bruce Inverted Vee *Amateur Radio Techniques* (RSGB)
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Product Information AEA (Model HLP 25G 11.5 etc)

12 AEA Product Information (HF Dipole Model 4104)

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Storage Idea For End-Fed Antennas

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A device to allow storage and protection of end-fed wire antennas.

The main part of this system is the reel from a spool of solder. The reel is used to wind the antenna around when not in use

Place the reel inside a face-cream container, 5.5 cm high and 6.5 cm in diameter. A hole 5 mm in diameter is drilled through the side of the container to allow the wire, wound around the reel, to protrude. This wire is connected to a crocodile clip which is fed to the equipment.

Two holes are drilled, one in the top and one in the bottom to allow for a support wire. To erect, the crocodile is pulled to unwind the wire.

To retract the antenna, disconnect the clip from the equipment, untie the supporting wire, unscrew the lid and rewind the wire onto the reel until the crocodile clip meets the container. Replace lid.

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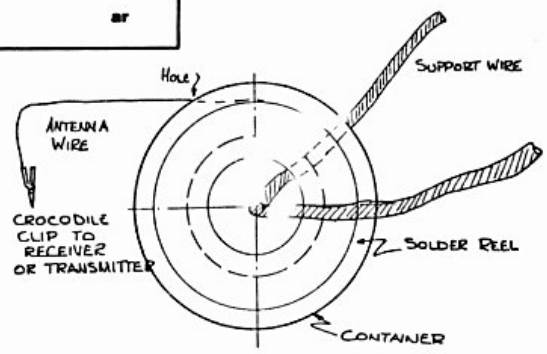

Figure 1: Construction of Antenna.

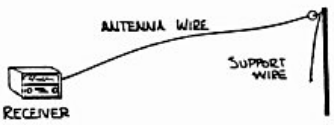

Figure 2: Erected Antenna.

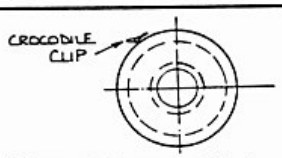

Figure 3: Rewound Antenna.

STANDBY BATTERY CHARGING

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This article is a collection of solutions to battery charging problems encountered over the years.

Lead-acid storage batteries are widely used as a power source in amateur stations, repeaters, alarms, and lighting systems, but if they are not correctly charged and maintained, they will have a limited life and may fail to supply the required power in an emergency. This article is a collection of the author's solutions to battery charging problems encountered over the years. The designs were tailored to use the components on hand at the time, and may be modified as required for different applications.

THEORY

A lead-acid cell has a nominal EMF of two volts, but the terminal voltage of a 12 volt battery may vary from 10.8 volts when fully discharged to nearly 15 volts at the end of a fast charge. The sulphuric acid in the electrolyte is consumed during the discharge reaction. The state of charge may be estimated by measuring the specific gravity of the acid with a hydrometer. The electrolyte in a fully charged cell should have an SG above 1.20, decreasing to nearly 1.00 when discharged.

A standby battery is usually charged at a current, in amperes, not exceeding one tenth of the battery capacity in ampere-hours although a higher current can be used for the initial part of the charge. As the battery approaches full charge the surplus charging current will decompose the water in the electrolyte into hydrogen and oxygen which is vented to the atmosphere through the cell caps.

A car battery should give five to 10 years service in an amateur station, but many batteries lose much of their capacity within a year or two as a result of neglect or improper charging methods. When a battery is left in a discharged state the lead sulphate formed in the discharge reaction becomes insoluble in the very dilute acid and the battery cannot be readily recharged. A modest overcharge will not harm a battery provided the cells are topped up with distilled water but a prolonged overcharged or too high a charging current can result in excessive electrolyte loss and plate damage.

UNREGULATED BATTERY CHARGERS

A simple battery charger (Figure 1a) consists of a transformer, rectifier and light globe whose resistance rises with the current and protects the charger from shorted output leads or reversed batteries. The lamp brilliance will reduce as the battery approaches full charge and the terminal voltage rises. The current may also be controlled by a 240 volt light globe in the primary circuit (Figure 1b), but an output fuse is necessary to protect the rectifier from a reversed polarity battery.

Some small home battery chargers (Figure 1c) provide partial regulation by using a lower voltage transformer, so that the rectifier only conducts at the voltage peaks when the battery is fully charged. The thermal cut-out will limit the average current if the charger is used on a very flat battery or the output leads are shorted or reversed.

The unsupervised use of a trickle charger often leads to serious overcharging which is a common problem with the batteries in amateur stations, rural fire engines and emergency lighting systems. The pulsating nature of the charging current can introduce hum into any equipment operating from the battery. The full output voltage of the charger which is typically 16-20 volts, will be applied to the equipment if the battery is disconnected while on charge.

FLOAT CHARGING

A float charger is a current limited power supply with an output voltage equal to the terminal voltage of a fully charged battery and the current tapers off as the battery reaches full charge. Float charging is widely employed in radio repeaters and applications where batteries need to be maintained at full charge indefinitely. Because the charger's output voltage is limited to the full charge battery voltage

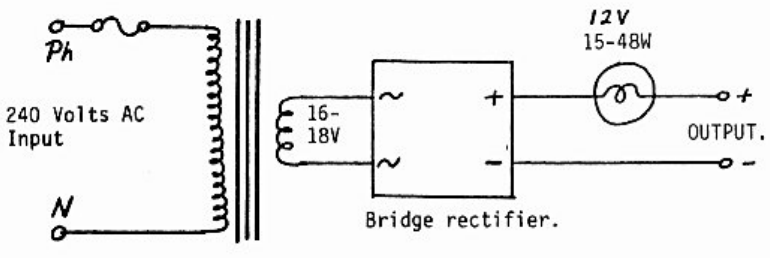

Figure 1a.

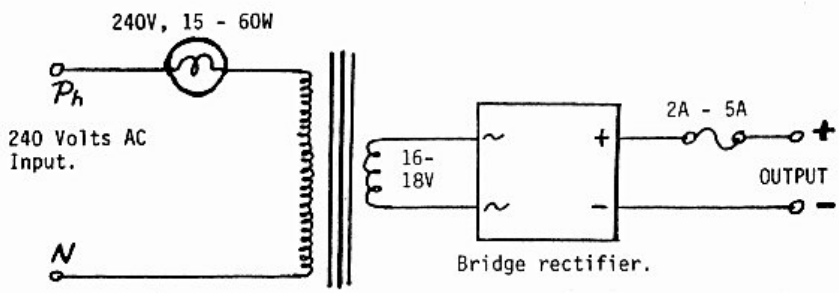

Figure 1b.

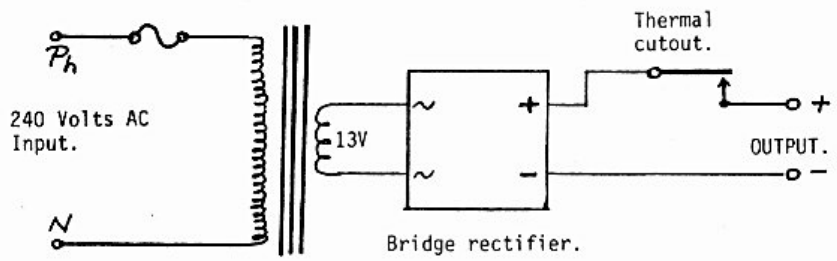

Figure 1c.

Figure 1: Typical unregulated charger circuits for 12 volt batteries.

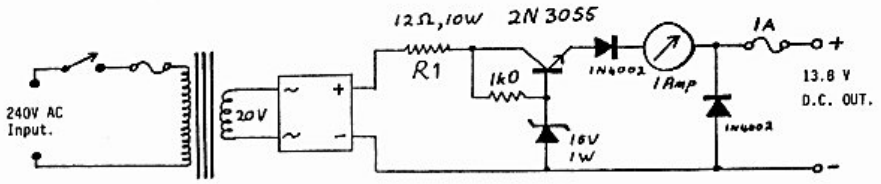

Figure 2: A simple voltage limited charger for 12 volts motorcycle batteries.

there is no possibility of damage to electronic equipment if the battery is disconnected while being float charged.

The simple charger of Figure 2 was constructed by the author for the overnight charging of 12 volt motor cycle batteries used to provide power for portable instruments. The batteries would be put on charge at the end of one working day and removed at the start of the next. The initial charging current, set by R1, was about 800 mA which reduced to less than 50 mA when the battery reached full charge. A 12 volt battery may be float charged at 13.8 volts for several days but the voltage should be reduced to between 13.2 volts and 13.4 volts for long term float charging.

An adjustable float charger using a three terminal regulator is shown in Figure 3, and other regulators may be substituted for the LM309K if the values of R1 and R2 are altered to suit. This circuit is used by the author for float charging a car battery which provides the 12 volts power for the station. The one amp current limit is adequate to cope with the quiescent power drain of the radio equipment and charge the battery from flat over two or three days.

Storage batteries benefit from regular exercise and a battery should be discharged occasionally to maintain its capacity. The author's batteries are discharged each month through a lamp bank (Figure 4) until the terminal voltage falls to 11 volts.

CYCLE CHARGING

A cycle charger charges a battery to a preset voltage. The charger is then turned off until the battery has partially discharged. The circuit of Figure 5 was used to control a commercial five amp charger connected to the 12 volts 100 amp/hour battery used to supply power for the alarms and emergency lights at the local fire station.

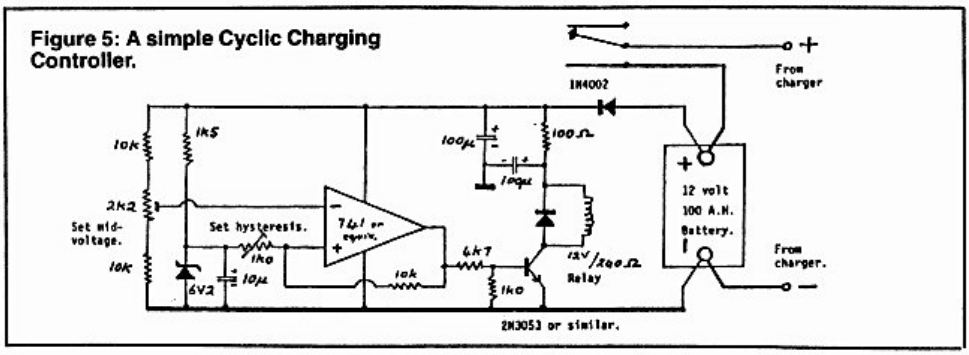

Figure 5: A simple Cyclic Charging Controller.

The controller is set to turn the charger on when the terminal voltage falls below 12.6 volts and off at 13.8 volts. There is some merit in using a larger amount of hysteresis, say 12.0-13.8 volts, to allow the battery to partially discharge each cycle. The voltage must be sensed at the battery posts via a separate pair of wires or the controller will include the voltage drop along the charger's output leads and the battery terminals.

SAFETY PRECAUTIONS

Battery acid is very corrosive, burns the skin, and can cause blindness if splashed in the eyes. A gassing battery will generate a fine acid mist above the battery and may even eject drops of acid if the charge current is too high. This will result in corrosion of the battery terminals and surrounding area as well as presenting a safety hazard when handling the battery.

The hydrogen-oxygen gas mixture generated by a charging battery is highly explosive and can be easily ignited by a flame or spark. The resultant explosion can easily rupture the battery and spray acid over a wide area. Several people are blinded or killed each year as a result of removing a live charging lead from a gassing battery or smoking while checking the acid level.

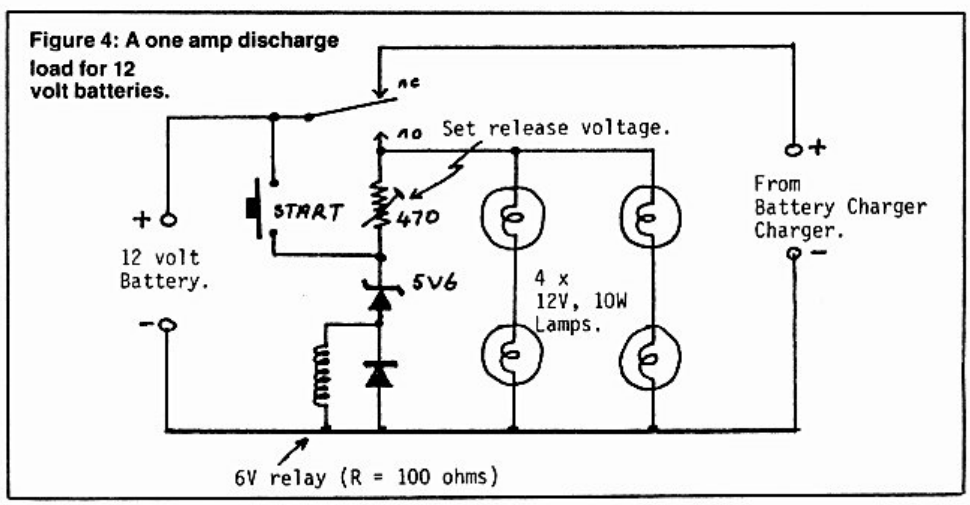

Figure 4: A one amp discharge load for 12 volt batteries.

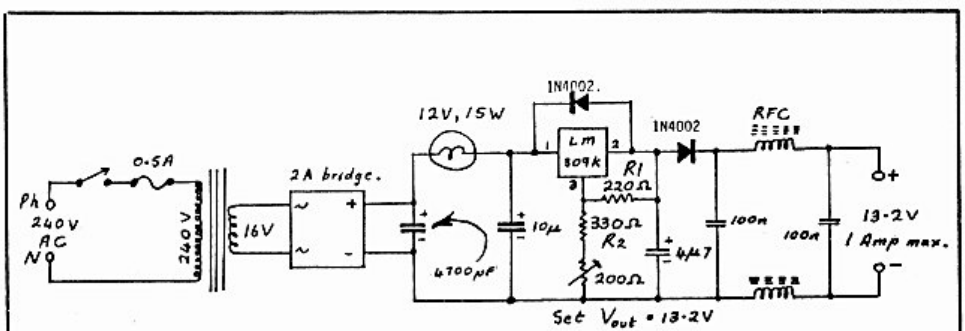

Figure 3: An adjustable Float Charger using a three terminal voltage regulator. Note — RFC = six turns through a ferrite bead. (Recommended to prevent RF Feedback).

TECHNICAL EDITOR'S NOTE

Batteries for stationary service are available. They have explosion-proof vent caps. They are also suited to float operation. Other batteries for cyclic operation such as solar charging are available.

Car batteries, whilst readily available, have been built for automotive use. They are less than ideal for stationary and float charge service.

Stationary batteries are available from Chloride Batteries, Besco Batteries, Dunlop and other suppliers. They are dearer than car batteries but do not suffer from acid spray and explosion problems due to sparks. They will also last much longer.

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PEP REVISITED

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Back in 1981 I wrote an article with the intention of clarifying the meaning of PEP. Judging from some of the recent letters to the editor of AR it is time to try again.

AC VOLTAGES

A little revision of some AC theory is a good way to start. Consider the AC waveform shown in Figure 1. It represents a complete cycle of a sinusoidal signal; the frequency is unimportant.

The symbol v represents the instantaneous voltage at time t. As t varies so does v, reaching a maximum positive value before falling to zero and then achieving a negative value of the same maximum value as the previous positive voltage. This value which occurs at the peaks of the waveform is called, not surprisingly, the peak value, and is given the symbol Vp in Figure 1.

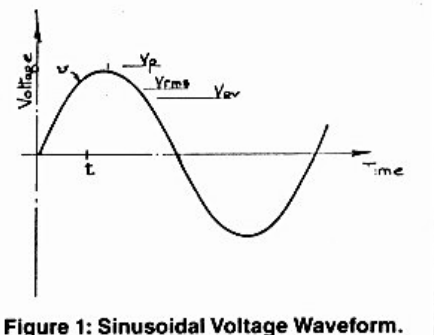

Figure 1: Sinusoidal Voltage Waveform.
The peak voltage is represented by Vp.
The effective voltage or root-mean-square voltage is represented by Vrms.
The average voltage (for any complete half-cycle) is represented by Vav.
Vrms = 0.707 Vp.
Vav = 0.637 Vp.

It should be obvious that the average value of the voltage over any half cycle must have an amplitude of something between 0 and Vp. For a sinusoidal signal as shown the average value is 0.637 Vp or 63.7 percent of Vp. Thus an average reading voltmeter calibrated on DC would read 63.7 percent of Vp. The more common type of permanent magnet moving coil meter used on DC will not indicate anything as the average value of a sine wave over a whole cycle is 0. The rectifier circuit shown in Figure 2 allows such a DC type meter to read the average value of an AC signal over more than a half cycle and is used in most moving pointer multimeters.

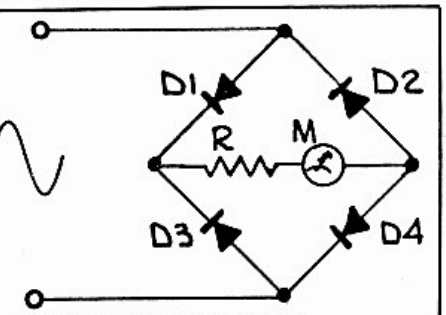

Figure 2: Rectifier Voltmeter.
This circuit enables a DC voltmeter, M, to indicate the average value of an AC waveform. It can be scaled to read RMS voltages providing the voltages are sinusoidal.

The same circuit, with a simple modification, enables the meter to indicate the peak value of the waveform. See Figure 3. A capacitor placed across the rectifier output charges to the peak and, provided that it is large enough, it does not discharge appreciably through the meter before the next peak arrives to top up the charge. A halfwave rectifier or a bridge rectifier may be used.

If the capacitor is too large it may not reach the peak voltage due to the limit on charging current imposed by the diode resistance and the voltage source impedance. Some care and compromise may be required in designing a peak-reading meter.

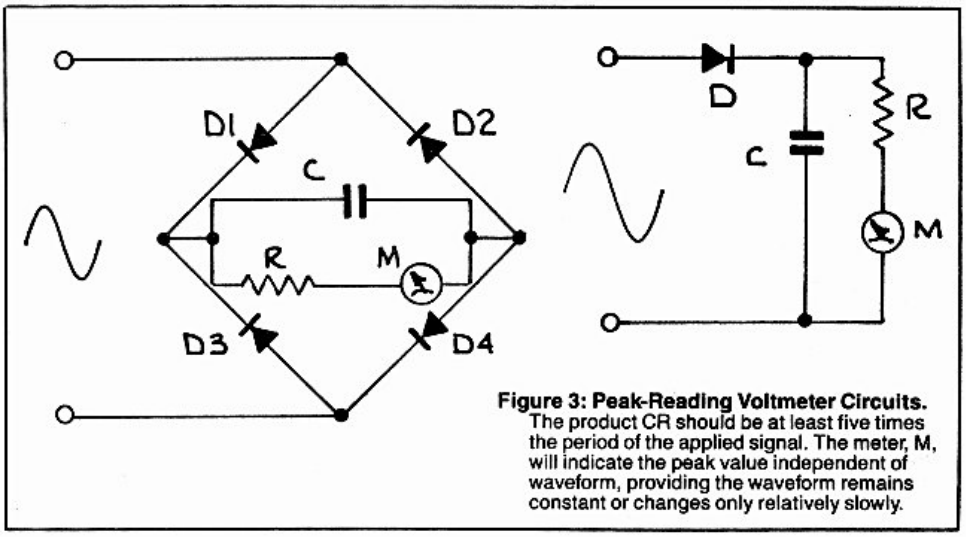

Figure 3: Peak-Reading Voltmeter Circuits.
The product CR should be at least five times the period of the applied signal. The meter, M, will indicate the peak value independent of waveform, providing the waveform remains constant or changes only relatively slowly.

POWER

So far, so good, I hope. If we apply a DC signal with a value of V volts to a resistor of value R ohms the power dissipated, P, is given by:

$$P = V^2/R \qquad (1)$$

Now suppose we were to apply an AC signal to the same resistor R. What voltage should we apply to generate the same amount of heat? It happens that the peak voltage should be greater than the DC voltage V. As the peak is sustained only momentarily it is only to be expected that the effective heating will be less than would be calculated from Vp when average power is concerned. It may be thought that the correct voltage to be used would be the average voltage, however a mathematical analysis or a practical experiment would soon show that a slightly larger fraction of the peak voltage needs to be used. The AC voltage that has the same effect as a DC voltage V is called the effective voltage and has the same size, in volts, V. For example, if a 10 volt DC signal is applied to a 1 ohm load then it will produce 100 watts of heat. The AC voltage that has to be applied to a 1 ohm load and also produce an average 100 watts of heat would be called 10 volts also. This effective voltage is called the RMS voltage to distinguish it from the peak or average or DC voltages but as it is the most commonly used measure of AC voltage the letters RMS are sometimes dropped. The RMS or effective voltage is 1/1.41 times the peak voltage or .707 Vp. The name RMS voltage comes from the mathematical form it takes when derived from theory (root-mean-square).

A small calculation shows that the RMS voltage is 1.11 times the size of the average voltage. Thus an average reading AC voltmeter can be rescaled to indicate the RMS values, providing that the waveform is substantially sinusoidal. If the signal has 10 percent distortion and this is essentially second harmonic distortion, then an average reading meter may be in error by up to five percent. If the distortion is essentially third harmonic then the meter error may be up to 3.3 percent. For many applications a true RMS voltmeter is necessary. These are very expensive if they are required to measure RF voltages thus alternative approaches are used.

For RF signals the peak voltage is easy to measure so RF wattmeters are sometimes constructed by placing a peak-reading voltmeter across a matched line or a resistive load. The power P is given by:

$$P = Vp^2/2R \qquad (2)$$

Thus, for a 50 ohm load a voltmeter reading of 10 volts represents a power of:

$$(10x10)/(2x50) = 1 \text{ watt.}$$

An RMS voltmeter would have indicated 7.07 volts.

ie power = 7.07x7.07/50 = 1 watt as before.

Because of the squared voltage term, such wattmeters have a nonlinear scale which is compressed at the top part of the scale. Note that this applies regardless of the frequency of the waveform; it may be 50 Hz or 28 MHz or 10 GHz.

At this stage it is necessary to restate that the power we have been talking about is average power. That is, the power dissipated over an appreciable length of time. The minimum length of time for which the preceding statements apply is one half cycle of the AC waveform.

INSTANTANEOUS POWER

It is permissible to talk about instantaneous power, which is the power being dissipated at a split instant of time which is specified. If we

return to Figure 1, the instantaneous power at any instant is given by:

$$P = v^2/R \quad (3)$$

where v is the instantaneous voltage and the other symbols have their usual meaning.

Instantaneous power is not a good guide to how fast you can boil a kettle full of water; average power is.

The peak instantaneous power occurs when v - Vp and, although it is a useful measure when selling Hi-Fi equipment and the intent is to get the largest numbers, again it is not a good guide as to how quickly you can boil water. Water requires sustained heat to boil and so average power computed from RMS voltage is required.

PEAK POWER

In a communications circuit it is the power received that is important. Usually the received signal must be more than one cycle of RF and often 10 000 cycles or more of RF are required for any piece of information or transmitted intelligence. Thus, even for radar signals, which use short pulses, the important measure of power is average power of the RF waveform. If the waveform is pulsed, then the signal has an envelope as shown in Figure 4. This is the same waveform we might see from a CW transmitter sending dots. The power during key down is given by equation 3:

$$P = Vp^2/2R \text{ or}$$
$$P = Vrms^2/R \quad (4)$$

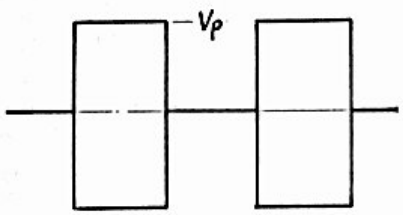

Figure 4: Envelope of a Hard-Keyed CW Signal.
Two dots are shown. The peak voltage of the envelope is Vp. The power with the key down is $(Vp)^2/2R$. The individual RF cycles are not shown as there would be at least 2000 per dot.

This is the same power that would be measured if the dots were extended until they became very long — the duty cycle could remain unaltered. Assume that the pulses are five seconds long. A fast responding wattmeter measuring the output would show zero power for five seconds and the key-down power, P, for the next five seconds. The average power over 10 seconds is however P/2. If the pulses were still sent at a 50 percent duty cycle but the repetition rate were changed to 1000 per second then the power meter reading would drop to P/2. This occurs because the response time of the meter is too short to follow the pulses and so gives an average indication. The key-down power is the significant one in determining performance. Hence it is necessary to describe this in an unambiguous way. Key-down power is an acceptable term, an alternative name which is often used is CW power. Peak envelope power (PEP) is also an acceptable description. It is the average power during that part of the waveform when it is at a maximum. In this example, the signal is either at zero or maximum and there is no ambiguity. In Figure 5 the keying waveform has been filtered to avoid the terrible key clicks that would be generated by the signal in Figure 4. Because of the changed waveform, the indicated average power may be different but the power during the peak part of the waveform is as before. Of course, the usual way of measuring CW output is to hold the key down long enough to get a meter reading, say two seconds, so few operators would be aware of the difference.

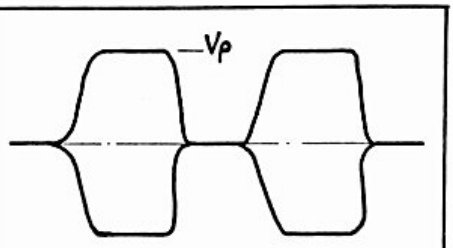

Figure 5: Envelope of a Soft-Keyed CW Signal.
The peak voltage of the envelope is Vp. The power, with the key down is $(Vp)^2/2R$.

If we were to send dashes as well as dots the duty cycle would change, the indicated power on a typical power meter would change but the PEP power would remain the same, assuming no changes in power supply voltages or load resistance.

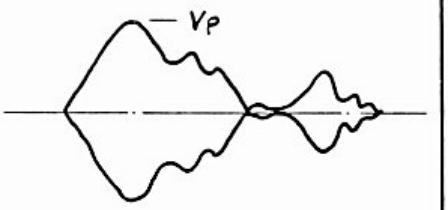

Figure 6: Envelope of an SSB Signal.
The peak envelope voltage is Vp. The Peak Envelope Power, PEP, is given by $(Vp)^2/2R$.

Suppose the waveform was as shown in Figure 6; similar reasoning applies. The envelope has a different shape and the maximum envelope power is developed only for a small fraction of the key-down time.

Restating what has been said so far, the peak envelope power (PEP) is the average power for one or more RF cycles at the peak of the envelope.

Thus for an SSB signal, the PEP is obtained from measurements made of the average power during the few RF cycles when the modulation waveform or RF envelope is at a maximum. These measurements may be made using an oscilloscope to measure Vp at the waveform maximum and then calculate the power using the equation (3) given.

Alternatively, a waveform of specified shape may be used and a conversion made from average indicated power to PEP. This procedure is given in the "current" *Amateur Operator's Handbook* published by DOC. Figure 7 shows the envelope of a two tone signal from an SSB transmitter. Two audio tones of equal amplitude, but not harmonically related, are fed into the transmitter and the audio gain adjusted until the envelope just begins to flatten on peaks. At this point, the transmission becomes broader — splatter starts. This is therefore the maximum output to which the transmitter should be driven. A calibrated peak voltmeter or oscilloscope could be used but the DOC preference has been to measure the power by using an RF ammeter in series with the load. Up to 20 years ago, RF ammeters were available from disposals stores, but are a rarity now. The RF ammeter contains a low value resistor which becomes quite hot from the passage of current through it. This heat is applied to a small thermocouple. A sensitive millivoltmeter indicates the thermocouple output on a scale that is marked in milliamps or amps. The scale is a square law one as would be expected. These meters can be calibrated on DC once their frequency response is established.

Of course the power calculated from the reading, I, of such a meter is average power, not PEP.

$$P = I^2R \quad (5)$$

The handbook states that this power must be multiplied by two to obtain PEP. This has led to the erroneous ides that all power meter indications must be multiplied by two to obtain PEP. If a peak reading voltmeter is used, the PEP could be overstated by a factor of four.

It should be noted that DOC have moved with the times and now allow a range of methods to be used to measure PEP.

PERPETUAL MOTION

A number of construction articles recommend using a circuit similar to that shown in Figure 3, to measure the power dissipated in a 50 ohm load. Often they calculate the power on the basis of V^2/R, where V is the indicated voltage for a steady tone or key-down carrier. This of course gives twice the actual power which is flattering but quite untrue, as alas, most flattery is. Few small linear amplifiers exceed 30 to 50

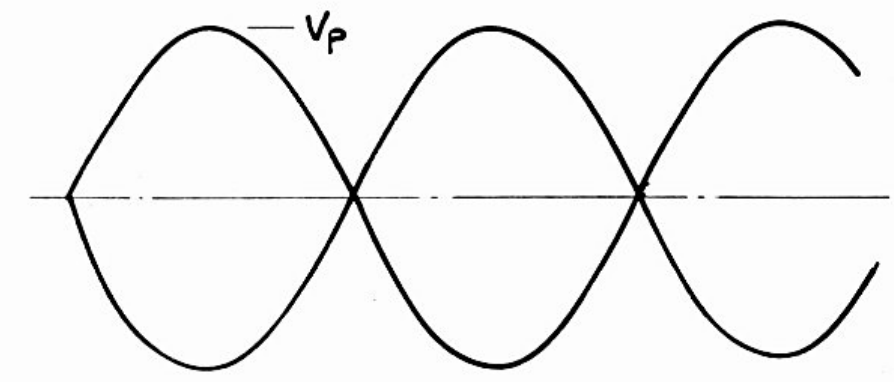

Figure 7: Envelope of a Two-Tone SSB Signal.
The peak envelope voltage is Vp. The Peak Envelope Power is given by $(Vp)^2/2R$. This is twice the average power.

percent effective efficiency while, for larger ones, the efficiency ranges from 30 to 65 percent. Using the method indicated by some authors leads to a PEP output which exceeds the DC input. If this were true, once the rig had been fired up, it could be used to supply its own power and still have enough left to sell back to the electricity supply authority.

Most modern multimode transceivers give the same peak output for CW and SSB so a rig giving 100 watts out on CW with the key held down can be expected to give 100 watts PEP out on SSB. Older valve rigs with poorly regulated power supplies managed up to 50 percent more PEP out, and many tended to self destruct if the key was held down for long, so the CW rating was reduced to avoid overheating. CW has a higher duty cycle than uncompressed SSB, hence the extra heat. This has no doubt contributed to the common use of various "corrections" to arrive at a PEP rating, some of which seem to promise a form of perpetual motion.

TWO-TONE MEASUREMENTS

To conclude this part of the discussion, it is worthwhile considering why the factor of two is used. The two-tone envelope in Figure 7 is produced by the two tones combining to form a voltage which is the sum of their values at every instant. When both tones are positive, a positive signal results. When the tones are both negative, a negative signal results. If they have equal magnitudes, but opposite polarity, then the signal goes to 0. The maximum voltage is twice the value of either tone. We can calculate the power in each tone from:

$$P = I_t^2 R \qquad (6)$$

where I_t is the current produced by one tone alone.

The average power is obviously the sum of the power produced individually by each of the two continuous tones. This is the power that the RF ammeter indication would give.

Suppose that the ammeter read 0.707 A for a single tone and the load was 50 ohms.

$$\text{Tone power} = 0.707 \times 0.707 \times 50$$
$$= 25 \text{ watts}$$

If both tones were applied together we might expect the ammeter to read 1.0 A, giving an average power of:

$$1.0 \times 1.0 \times 50$$
$$= 50 \text{ watts}$$

Remember that in a linear amplifier each tone contains the same (average) power, thus the combination of both tones gives twice the (average) power of either single tone.

The combined tones produce a current envelope of the same form as the voltage waveform in Figure 7. The transmitter will be driven harder on peaks with two tones together than with either tone alone. If one tone produces 0.707 A then this is doubled to 1.414 A at the peak of the current envelope.

Thus:

$$PEP = 1.414 \times 1.414 \times 50$$
$$= 100 \text{ watts.}$$

Because of the waveform the average current shown on the ammeter will be only 1.0 A as expected from the foregoing.

Thus, PEP = 2x(average power) for a two-tone signal.

DOC POWER LIMITS, A HISTORICAL NOTE

When Australian amateur radio operation resumed after the war, the maximum allowable power was (I think) 50 watts DC input to the final amplifier. As the only modes used were CW and AM, this presented no measurement problems. There were a few experimenters using other modes but they were technically advanced and power measurement presented little problem. The power limit was raised eventually to 150 watts DC input. As SSB and, for a brief time, DSB began to appear in quantity on the bands the DC power input required revision. It was argued by Harold VK3AFQ, and other members of the WIA, that the PEP power input for a 150 watt AM final amplifier was 600 watts. If a final amplifier efficiency of 66.7 percent were assumed, then the PEP output would be 400 watts. At the time there was considerable pressure from AM exponents who thoroughly disliked SSB (Duck Talk) and did not want to be disadvantaged in terms of input power. The 400 watt limit was of course accepted. The British Post Office also adopted the same limit.

The rating of equipment in terms of its output is clearly a more sensible approach. This has been followed by DOC. The 120 watt output rating for FM and other transmissions appears to be based on a final amplifier efficiency of 80 percent which is more generous than the consideration for SSB. Another matter which may influence future decisions is the rating of commercially available equipment manufactured for the amateur market. But that's another story.

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1 GRAY, A, WALLACE, G A. *Principles and Practice of Electrical Engineering*, McGraw-Hill. 1955.
2 *Amateur Operator's Handbook*, Revised December 1978, Postal and Telecommunications Department.
3 *Care and Feeding of Power Grid Tubes*, Varian Eimac, 4th Printing, 1982, 67-30070.
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5 Novice Notes, *Amateur Radio*, November 1981.

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MILITARY RADIO COLLECTING

An interview with Colin MacKinnon VK2DYM

How does one become interested in collecting military radios?

In recent issues of Amateur Radio *we have featured a series of articles on vintage receivers and military radio equipment. In 1983,* Amateur Radio *magazine printed a series on modern Army surplus radios. The author of these articles was Colin MacKinnon VK2DYM. Following is an interview with Colin.*

"My interest in electronics began in the early 1950s at about the age of 12, whilst living in Orange, NSW, and was due to trying to listen to Sydney radio stations on an old four valve radio. To improve reception I built longer and higher aerials, and the family radio was heavily modified, not always successfully. I haunted the local radio repair shops. scrounging spare parts, and did repairs of the neighbours' radios. I learned by trial and error, mostly error.

"I became interested in amateur radio after finding and visiting a local amateur, Norm Skulander VK2JW, who had an ex-RAAF AT-14 transmitter (capable of 500 watts AM). I would sit in his shack listening to people such as John Moyle VK2JU, and Joe Reed VK2JR. I was fascinated by the big black AT-14, and watching the 866 rectifier valves glow lovely shades of purple in synchronisation with Norm's voice, as he transmitted.

"My first real radio was a BC-348Q, which I saved up for months for and purchased from Tom Thorpe VK2QT. With the set I could listen to both local and overseas amateurs. The BC-348 was soon improved with miniature valves and converters for other amateur bands.

"My next venture was to purchase an SCR-522, by mail order, from Deitch Brothers, in Sydney. In due course it arrived at the local railway station and I pedalled my bicycle the three miles to town to retrieve it. I was a little shocked when I discovered it was not the one foot cube size I had imagined from the magazine photographs, but instead was in a wooden box about five feet long and three feet square, weighed a ton! I did get it home but the bike was never the same. It took ages to get the SCR-522 operating because I had no technical details on it, and could not find anyone in Orange to talk to on two-metres anyway.

"Perhaps these early experiences with military radios are the reason for my current interest in collecting them.

"In 1959, I became a foundation member of the new Orange Amateur Radio Club, joined the WIA, and commenced studying for my licence. However, other activities, such as earning a living intervened, and I was unable to pursue my interest in amateur radio. I moved to Sydney and it was another 20 years before I took up a serious interest in radio again. In February 1981, I gained my amateur licence as VK2KCM, and upgraded to a full license in May, as VK2DYM.

"It was Ian O'Toole VK2ZIO, who introduced me to the Sydney surplus dealers (what few were left by 1981) and the joys(? ?) of military surplus radios. From picking up one or two useful bits here and there, I have progressed to having a garage full of junk that will someday come in handy? ! ?

"I found that many people were throwing out old surplus radio equipment because it was no longer of any use for conversion or parts.

"I felt it would be a shame to see it lost forever, so have become a collector of military communications and very old amateur gear. I think of it as my contribution to saving history. My wife just thinks I am mad.

"Often the families of Silent Key amateurs are at a loss to know what to do with the equipment, papers, QSLs, etc, some of which may be of relevant historical interest. I try to assist, but so often I hear of the lot being dumped to clear the space! As a plea to all readers, if you want your radio gear, precious log books, etc, to be saved. make a list now and tell someone of your wishes.

"My collection numbers about 150 different military radio sets, plus a fair amount of technical data. The sets range from the CPRC-26, a Canadian walkie-talkie of about one kilogram, to an AT-13 which weighs 600 kg and stands nearly six feet tall. Most of the radios are Army equipment, but I do have some Air Force and Navy equipment too.

"I also collect literature relating to the early technical history of radio, and particularly if it relates to amateur activities.

"Unfortunately, I only began collecting three or four years ago, so have missed out on the mass of surplus equipment that was available in the 40s and 50s. For example, I do not have an AR8/AT5, even though there are probably hundreds still around, in various junk piles.

"One day I hope to place my equipment on working display, but in the meantime, I do write articles for the amateur press describing items in my collection in the hope that others will derive some interest and pleasure from them. I also research and write items on aspects of early radio, with emphasis on the technical details. These articles appear in the magazine of the Historical Radio Society of Australia. As well, I participate in exhibitions at local schools, etc, with some of the pieces of equipment.

"The equipment in the photograph comprises, from top left: a No 62 MKII set, used by the Australian Army; a WS 208 MKII, which is a small portable Army set; A no 19 MKII (Aust); and a BC-611-F , the US walkie-talkie. On the middle shelf are an RC7C set; an R-110, a US receiver of Vietnam vintage; a PRC-10 as used by many armed forces up to the 70s; next an ARB aircraft communications receiver; and a British R-1155 receiver. On the lower shelf are a TA-12B, an aircraft transmitter; an ATR-4, which was in use as an RAAF portable set; and a Collins 51J-4 communications receiver. I am in the photograph to stop the rack from collapsing! There is one inescapable feature of military radios, they are usually very heavy.

Colin is always on the lookout for any surplus military equipment or technical manuals. He is also prepared to copy any manuals. Contact him before you take a trip to the rubbish tip at the above address.

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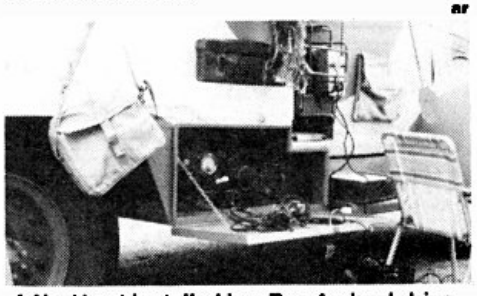
Part of the military radio collection of Colin VK2DYM.



A No 11 set installed in a Reo 4 wheel-drive truck, painted in desert camouflage. (From Colin's album).

MOBILE HF RADIO AT THE WOOMERA RANGE

Lloyd Butler VK5BR
18 Ottawa Avenue, Panorama, SA. 5041

During the height of activity at Woomera, there were people who ventured into vast areas of uninhabited land in a range 2000 km long, their only communication, HF radio. Here we discuss the mobile radio equipment they used and the background of its development.

On April 1, 1987, the Laboratories of the Defence Science and Technology Organisation, at Salisbury, celebrated the 40th anniversary of its first formation as the Long Range Weapons Establishment (LRWE) in 1947. The establishment was formed to support a range at Woomera which experimented with guided weapons, pilotless aircraft and air launched equipment as a joint venture of the United Kingdom and Australian governments. Over recent years, the operation of the range has been gradually phased down and the function of the establishment has changed, with several changes in name and departmental control.

During the height of operations at the Woomera range, the establishment was called the Weapons Research Establishment (WRE) and, as shown in Figure 1, the range firing area was extended 2000 km over vast areas of uninhabited land to Talgarno on the north-west coast[1]. Various parties were required to venture into this land, often as lone individuals who drove Landrover vehicles where there were no roads and who had to survive the harsh environment of the bush for weeks or months at a time before returning to civilisation. Amongst these individuals is the name of Len Beadell, well-known for his many books published about his experiences in the bush.

People who ventured into the bush came from various sections and departments with various functions to carry out. They included survey parties, the reconnaissance section, national mapping, works personnel, Commonwealth police and range security, native affairs officers, the range missile recovery team and many others. Each of these vehicles used by these parties had to be equipped with HF radio because HF radio communication was the lifeline back to civilisation. The purpose of this article is to discuss this mobile radio and, in particular, the radio transceivers progressively used over the years to do the job.

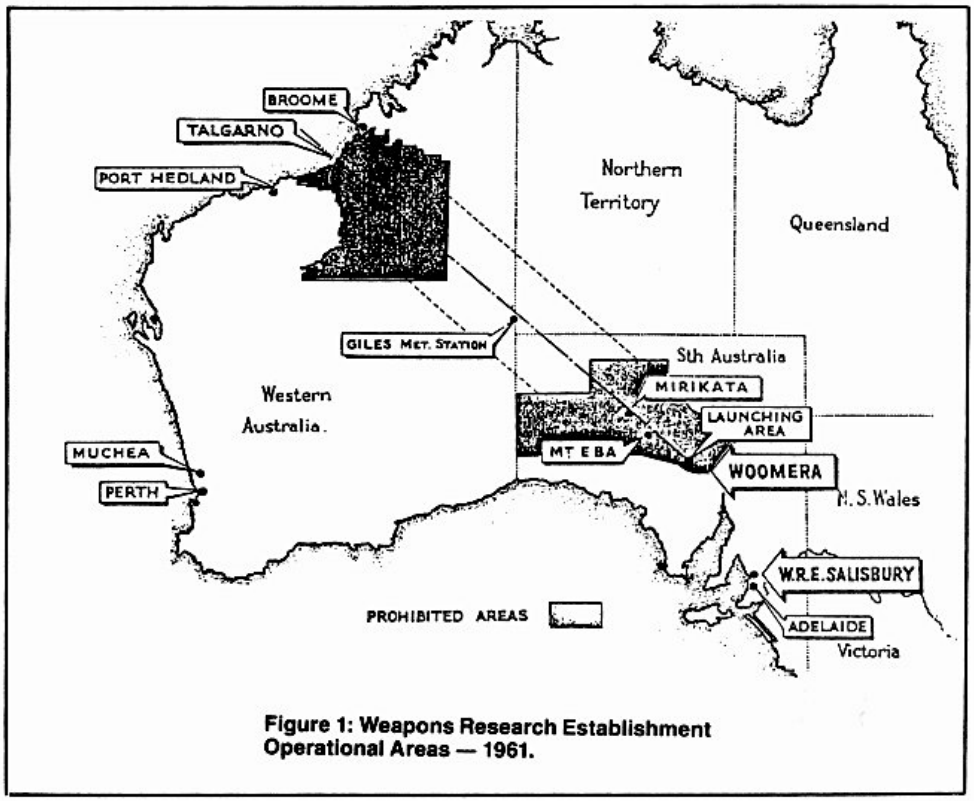


Figure 1: Weapons Research Establishment Operational Areas — 1961.

THE TRANSCEIVERS

Outside the research establishment, what will generally be unknown is that two models of mobile HF transceiver were designed and built by the establishment and provided for the bulk of mobile HF radio installations during the height of activity at the range. Much of the initial discussion concentrates on these transceivers, the basis of their development and their application in the field. Reference will also be made to some of the people involved.

The environment of the bush was harsh and the radio equipment often had to endure extremes of vibration and mechanical shock due to the rough terrain. Added to this were the high temperatures encountered within the vehicle from the hot northern sun and the dust which could get into switches and connectors to cause problems.

The harshest treatment was probably given to radio sets installed in the missile recovery vehicles. Considering the endless supply of whip aerials needed for replacement and the extent of tree foliage which finished up in the radio equipment, it would seem that these vehicles were driven straight through the bush to their target just as one would drive a tank.

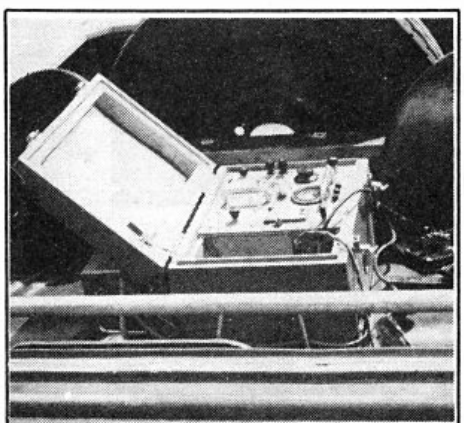


Figure 4:LRWE Type 1 Transceiver — Installation.

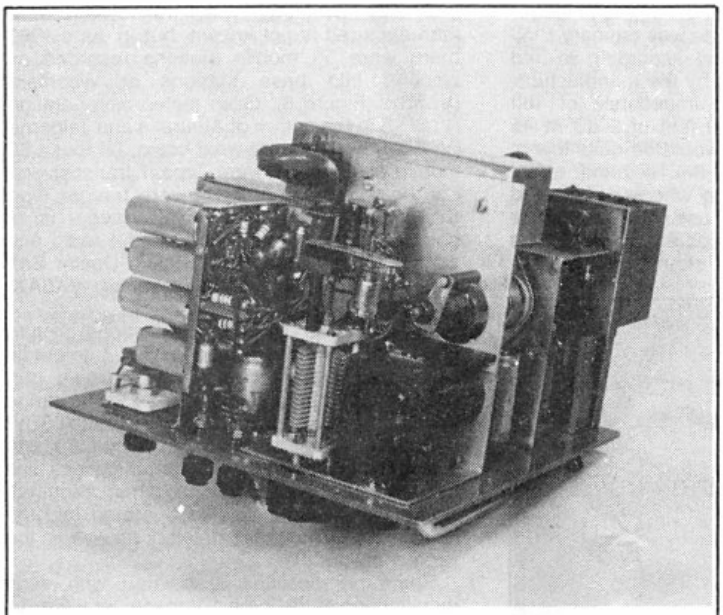


Figure 2: LRWE Type 1 Transceiver — Front.

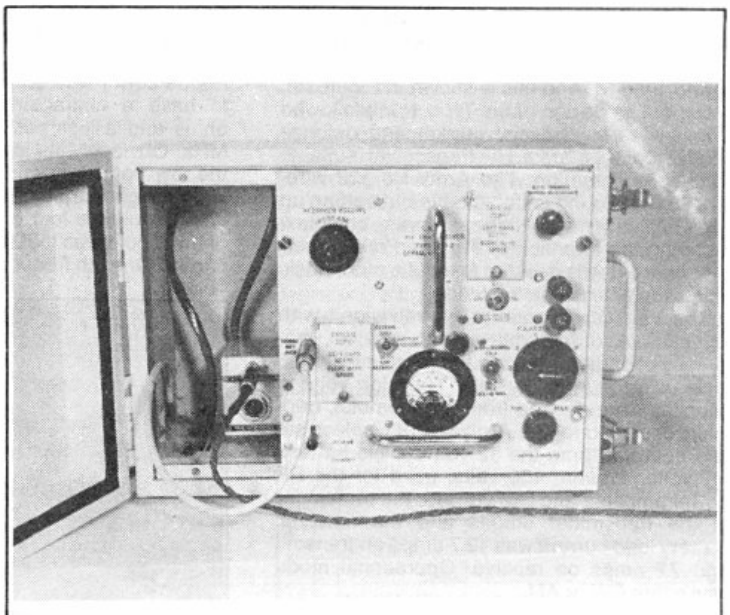


Figure 3: LRWE Type 1 Transceiver — Rear.

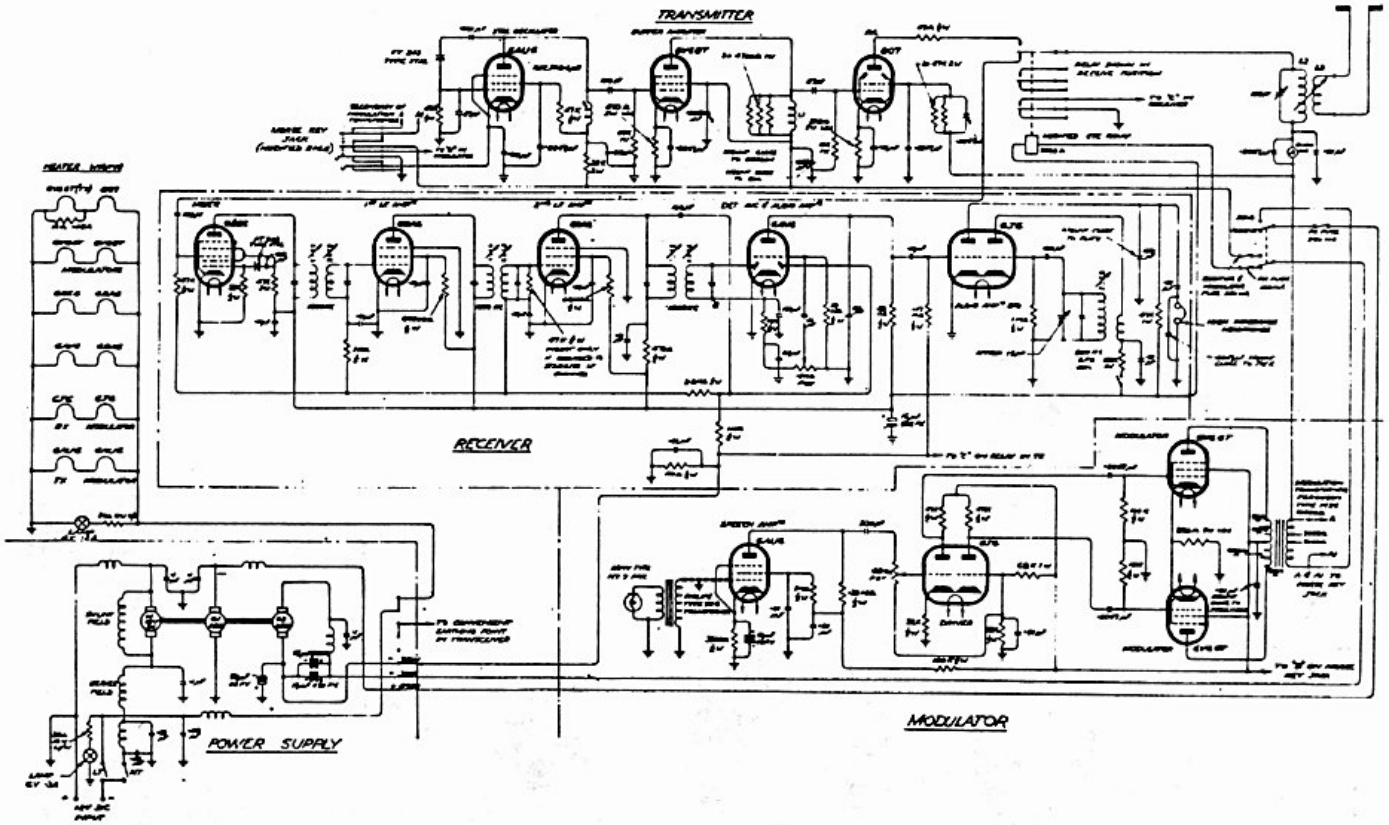


Figure 5 — LRWE Type 1 Transceiver — Circuit Diagram.

THE TYPE 1 TRANSCEIVER

The first transceiver, called the LRWE Type 1, was developed by Ted Peppercorn around the period 1950-51[2] and this is shown in Figures 2, 3 and 4. The design of the Type 1 unit followed a review of commercial market and defence service sources for a HF transceiver suitable for mobile operation. The Army No 122 wireless set was found to be suitable but setting up and adjustment of this set was complex, requiring the attention of a trained radio operator, hence it was decided to build a more basic unit, simpler to use in the field.

The transceiver was an all valve unit with crystal locked transmitter and receiver, frequency changeable within the range of 5 to 8.5 MHz using plug in crystals. The high voltage supplies were derived from a genemotor, originally designed for the Army No 19 wireless set and operated from the 12 volt vehicle battery. HT voltages were 450 volts, used for the RF power amplifier and 250 volts for the remainder of the transmitter stages and the receiver. Battery load current was 12.7 amps on transmit and 7.7 amps on receive. Operational mode was either CW or AM.

The circuit diagram for the earlier units constructed is shown in Figure 5. These had a valve type 807 as the final transmitter amplifier which delivered an RF output power of 15 watts. Later versions, designated Mark 2, were fitted with a valve type 2E26. In the receiver, two IF stages were used but the designer had aimed at simplicity and not included a premixer RF stage. A high IF frequency of 1600 kHz was employed to compensate for the resulting reduction in image response but this also set the bandwidth quite wide at 12 kHz. The output tuning and aerial coupling circuit for the transmitter was also used as input tuning and coupling for the receiver.

Vehicles were provided with whip aerials for mobile operation and wire dipoles to hang from available trees for stationary operation. Dipoles were fed via twin wire feeders cut to an electrical half wavelength to ensure that the dipole centre impedance was reflected at the transmitter, independent of the dipole to feeder mismatch. The feeder cable was ordinary PVC household twin cable and according to Ted Peppercorn[2], was quoted by the manufacturer to have a characteristic impedance of 160 ohms and a loss per 100 feet of 2 dB at 45 MHz. Obviously, its loss would be quite low at the low frequency end of the HF band, a fact which might surprise many who would discard it as unsuitable for aerial use. A disadvantage of the dipole was that a separate one had to be carried for each frequency channel required.

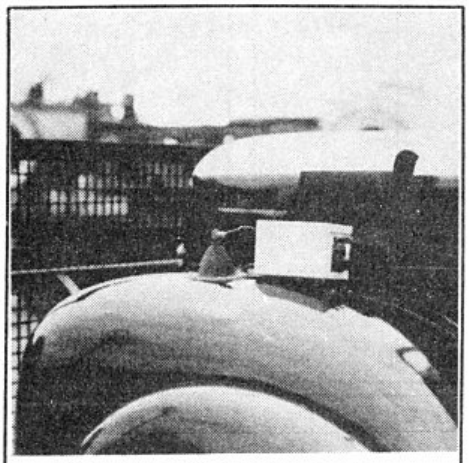


Figure 7: Whip Aerial Switch Box.

Whip aerials were base loaded as helical whips were not in common use at that time and whips with centre loading coils were too top heavy to stand up to the rough treatment through the bush. A conventional base loading coil is shown in Figure 6 fitted into the whip. Later installations had a tapped loading coil fitted in a switch box adjacent to the whip base, so that the loading inductance could be selected to suitably match the aerial for the channel frequency used. (Refer Figure 7).

Exactly how many Type 1 transceivers were manufactured is not known, but in June 1960 there were 50 mobile stations recorded as working into base stations at Woomera (VL5BW, Figure 8), Giles meteorology station (VL6DJ) in the centre of Australia and Talgarno (VL6DU) on the north-west coast. Of these 50 mobile stations, 37 were Type 1 transceivers. For the record, the other 13 were Traeger Type 51 MA valve transceivers. (Alf Traeger is, of course, famous for his early pedal radio and connection with the Royal Flying Doctor Service. Alf was also radio amateur VK5AX/VK8XT.).

To make the HF communications picture complete, there were also AWA 5A teleradio transceivers installed for early warning purposes at six station homesteads in the range area and a base station at Salisbury (VL5BV) which sent timing signals to Woomera and provided an emergency communications link between the two locations when required. Some mobile stations also operated into the Royal Flying Doctor HF network as well as the range network.

Some personalities associated with early installations of the Type 1 transceiver were Bill Lloyd and the late Fred Brown. (Fred was later responsible for radio maintenance at Woomera base). Another was Lofty Turner, who spent many hours in the screened room at Salisbury clearing faults on Type 1 units and carrying out alignment.

In later years, an attempt was made to decrease the bandwidth of the Type 1 receiver by using a second stage of frequency conversion to an IF frequency of 100 kHz. Some transceivers were modified by the addition of a transistorised conversion module but full scale conversion was superseded by the development of the Type 2 transceiver.

SKIP ZONE

HF communication relies on the ionosphere and communication difficulties were sometimes experiences because of the skip zone. Recovery teams required continuous com-

Figure 6: Base Loaded Whip Aerial.

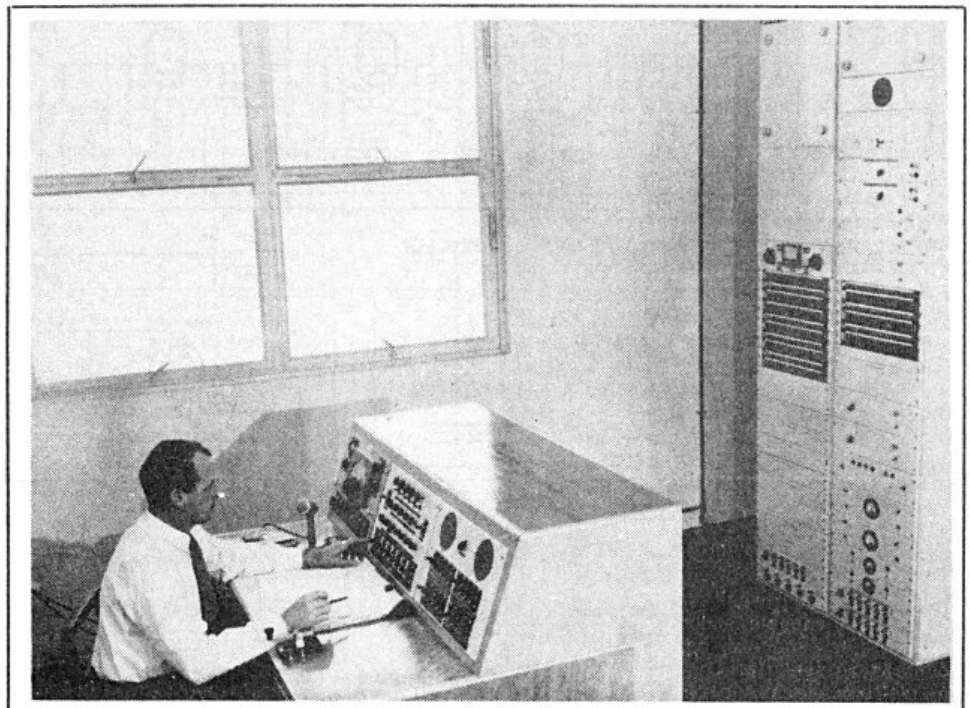


Figure 8: Woomera Base Station Control Centre.

munications as they proceeded down range and signal fade out was initially experienced as they moved out of the ground wave region into the skip zone. Communication was improved by installing remote receivers, connected via landlines, part way down the range at the Knoll and later, further down at Mirikata. Communication is the reverse direction was also assisted by locating the recovery channel transmitter some distance to the rear of the range proper at Woomera technical area.

THE TYPE 2 TRANSCEIVER

As years progressed. germanium transistors commenced to replace valves in low frequency applications. During the period 1958-59, small signal RF transistors, extending operation into the HF spectrum, became available to open the door for the design of a new transceiver, all transistor except for RF power amplification. Such a design would result in considerable reduction in battery load current in the mobile vehicle. At the time, there was no available transistorised unit on the market and the writer, Lloyd Butler, set about the design and development of a new unit based on the existing state of the art transistor technology[3]. The new unit was to be called the WRE Type 2 transceiver.

Quite apart from the advantage of reduced battery load, there were a number of other reasons why the new unit needed to be developed. There was a proven need for a wider frequency range than available in the Type 1 unit to allow for changing conditions of the ionosphere and the wide range of different distances covered. Receive capability up to 20 MHz was desirable to allow survey parties to tune the higher frequency channels of WWV. An additional amenities service could also be provided by the addition to the receiver of the MF broadcast band. There was scope for improvement in the receiver performance. Finally, the Type 1 transceivers were starting to respond unfavourably to the rough treatment they were getting and there was a clear need to give attention to prevention of damage from vibration, mechanical shock and dust.

With the help of John Langman, who also played an important part in the development, a prototype was assembled to the follow specification:

Transmitter — Three crystal locked channels within the range of 2.5 to 12 MHz
RF Power 10-12 watts
Receiver — Tunable range 2.5 to 20 MHz and 550 to 1500 kHz
Two crystal locked channels within the range 2.5 to 12 MHz
Mode — R/T or CW
Battery Load — Receive only 18 mA
Standby 820 mA
Transmit 5 A

The circuit of the Type 2 transceiver is shown in Figure 9. The receiver, modulator and transmitter power supply were all transistor, but at that stage of the technology, power RF transistors were yet to be introduced and use of RF power valves in the transmitter was still the only option. There were problems in maintaining temperature stability in the early germanium transistors of that era and considerable attention was given to this in the circuit design resulting in satisfactory performance to above 70 degrees Celsius. At that point in time, such a temperature was considered to be quite an achievement for germanium transistors.

The faithful 2E26 RF power amplifier was again used, but a more complex aerial loading circuit was included to allow internal pre-setting of the matching, for each channel, to a single long wire. The circuit was duplicated for whip aerial operation so that neither channel change, nor change from long wire to whip, required any adjustment by the operator. The circuit also eliminated the need for more than one wire aerial when using more than one channel. Use of a long wire was possibly not as effective as the dipole used in the Type 1 transceiver, but the thoughts were that it was difficult enough to find single trees for aerial support in parts of Central Australia, let alone two trees spaced, at a suitable distance to hang two ends of a dipole.

For the transmitter oscillator and power amplifier driver stages, special quality ruggedised versions of the 6AU6 and 6AQ5 valves were used.

The transistor HT power supply only operated on transmit, delivering 350 volts to a fully loaded transmitter at a current of 100 mA. Power supply efficiency was 70 percent.

The receiver employed an RF stage and two IF stages operating at a frequency of 455 kHz. Sensitivity for the HF bands was within one to two microvolts for 6 dB signal to noise ratio, degrading a little at temperatures approaching 70 degrees Celsius. Image performance was good except at frequencies approaching 20 MHz, not expected for an IF of 455 kHz.

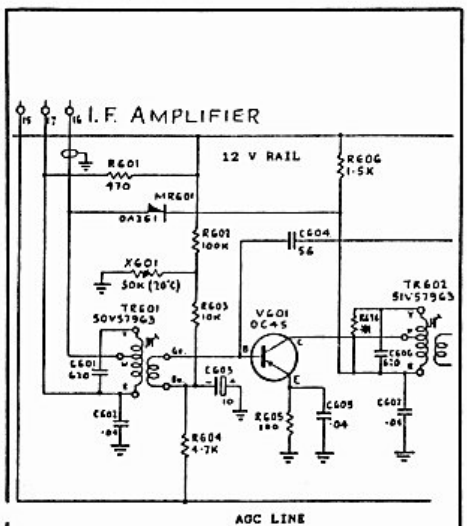


Figure 10: IF Amplifier with AGC Control.

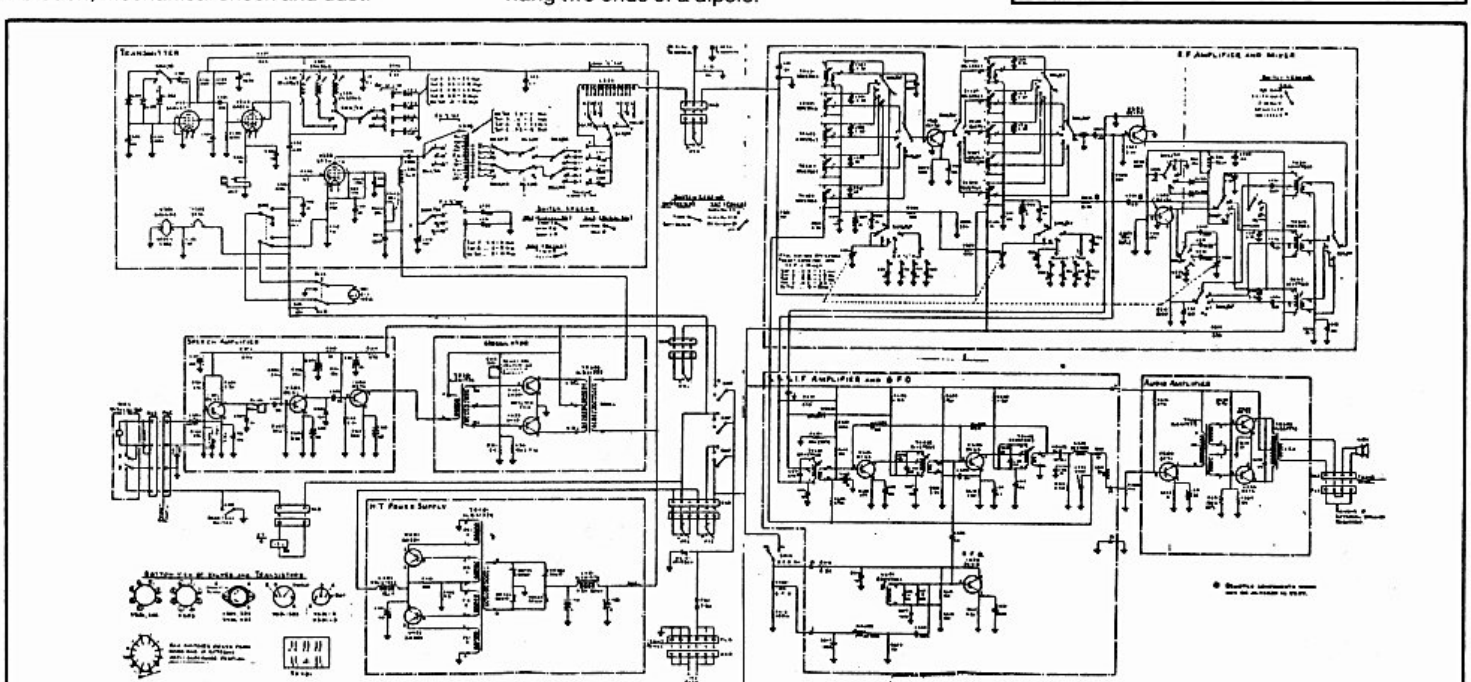


Figure 9: WRE Type 2 Transceiver — Circuit Diagram.

An interesting innovation was used in the RF amplifier and first IF amplifier, the latter being shown in Figure 10. In this circuit, DC feedback from the emitter is reduced by restricting the value of emitter resistor with resultant loss in temperature stability. This is compensated by the inclusion of a thermistor in the base bias circuit. The DC feedback works against the AGC control voltage and reduction of that feedback results in a dramatically improved AGC characteristic.

ENVIRONMENTAL TESTING

Assembly of a prototype led to the manufacture of two production models of the transceiver and the first of these was subjected to a range of environmental tests to stimulate field conditions including vibration, shock, temperature and dust tests. Available within the Establishment for this purpose was probably the best equipped environmental test facility in the Southern Hemisphere. (This facility still exists, as part of the Advanced Engineering Laboratory, providing an excellent service). A second production unit was tested operationally in a number of field trials.

In carrying out environmental tests, the help of Eric Grant from the environmental test section must be acknowledged. One interesting aspect of the program was a test carried out on a Landrover vehicle itself. With portable vibration test equipment on board, Eric and the writer sought out the roughest tracks which could be found around Salisbury to resolve just what vibration components were generated in the vehicle. This was necessary to select vibration mounts which reduced best those components which had the highest acceleration and did the most damage. For a given amplitude, the higher the vibration frequency the higher the acceleration and it was the high frequency high acceleration components which had to be reduced. This was at the expense of tolerating high amplitude but low acceleration low frequency components. What appears visually to be the best vibration isolation does not necessarily lead to the best result and without suitable vibration test equipment, selection of a mounting system would have been guesswork.

Before finalising drawings of the transceiver, it was necessary to look for components or parts of the assembly that exhibited mechanical resonance at a vibration frequency. This was done by mounting the unit on a vibration table and sweeping the vibration frequency through the anticipated range. Resonance was observed by flooding the unit with light from a stroboscope, chopped at a frequency near that of the vibrator. Components or sections of the assembly showing resonance had to be restrained to prevent mechanical fatigue and consequent changes were made to the manufacturing procedure. A lesson on environmental testing is not intended but the discussion does give some background to the work carried out before manufacturing detail of the transceiver was finalised.

PRODUCTION

A total of 29 Type 2 transceivers were manufactured apart from the prototype. Of these, eight were manufactured by WRE workshops and 21 were manufactured under contract by Amalgamated Wireless (Australasia) Ltd (AWA). The AWA units were similar to the WRE units except for minor construction details made to suit their own production system. (A typical unit is shown in Figures 11 to 13). The first two WRE units were made in 1960. These were followed by the AWA units which came off the production line in 1962 and a further six WRE which were made later on.

Personalities who assisted with the development and testing of the Type 2 transceiver included John Langman and Vin Agius. John, in particular, stayed with the work of the Type 2 to see them all tested and installed long after the writer had moved to other fields of endeavour. Drawings were prepared for production by draughtsmen, Dick Osborne and the late Mike Winterson.

Records show that by October 1967, 73 AM HF radio transceivers were in service around the range. By this time, Traeger was well into the production of a transistorised version of their transceiver and a number of Traeger types TM2 and TM3 were acquired to supplement the numbers of WRE Type 2 sets and replace some of the Type 1 sets. Consideration had been given to granting a contract for the manufacture of a further 20 Type 2 units but, with commercial transistorised transceivers then on the market, purchase of the latter appeared more cost effective.

The idea of the long wire, visualised for the Type 2 transceiver, suffered some change as vehicle installations proceeded. Traeger supplied a 35 feet telescopic whip which was put together from a number of short tubular sections and could be carried in the vehicle. A number of these whips were purchased for the Type 2 installations instead of, or to supplement, the use of the long wire in fixed location operation. The whip base support could be driven into the ground for support or the whip otherwise supported by fixing to the side of the vehicle. The high whip, of course, eliminated the need for those rare trees. Operationally, the high whip would have been ideal for ground wave and long hop paths, but not as good as the horizontal wire for short hop high angle paths. One danger of the high whip was the possibility that it could be erected near power lines, with the potential for electric shock from accidental contact with the lines. There is one disastrous accident on record to bear testimony of this.

THE TRAEGER SETS

As far as the Type 2 transceiver was concerned, the attention to environmental testing and vibration isolation paid off and they withstood the vehicle vibration better than the Traeger units. Notwithstanding this, towards the end of the AM era, the Traeger Type TM3 (refer Figure 14) replaced a number of Type 2 units for various reasons which will be discussed in the following paragraphs. Firstly, the Type 2 unit was designed to work with positive battery earth, the general standard in Landrover vehicles at the time of design. As time progressed, a number of new vehicles purchased were fitted with negative earth and the Traeger units were favoured because they had provision for earth on either rail. Some Type 2 units were modified for negative earth but to do this was not a simple process.

Another reason for changing to the Traeger unit was that it was smaller than the Type 2 and could be easily fitted under the vehicle dashboard.

A problem encountered with recovery vehicle installations was the variation in load impedance presented to the transceiver output by the short whip. A reason for this was that, when the vehicle was mobile, the top of the whip was tied down to reduce damage from trees passed and this resulted in a change in the electrical characteristics of the whip. Another reason was variation in contact resistance of the whip joints which in turn, varied the antenna loss resistance. The Type 2 loading system was based on pre-set adjustment with the idea that the unskilled operator be relieved of the task of aerial tuning. Apparently, the Traeger unit suited the application better because a simple aerial tuning adjustment was available to the operator which could be used to correct for the impedance change.

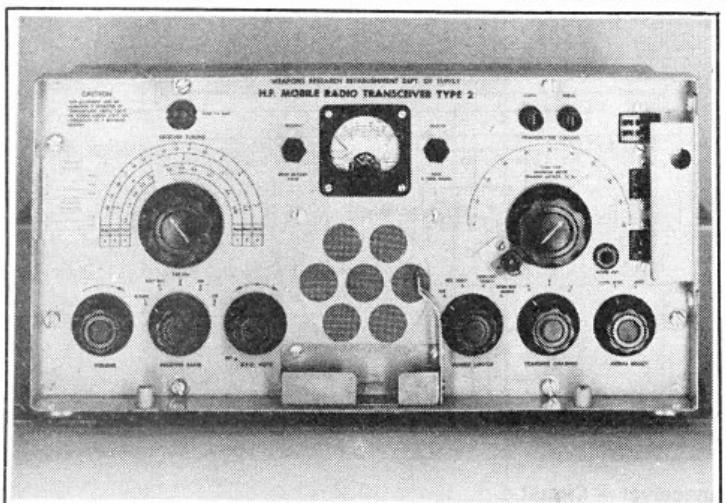


Figure 11: WRE Type 2 Transceiver — Front.

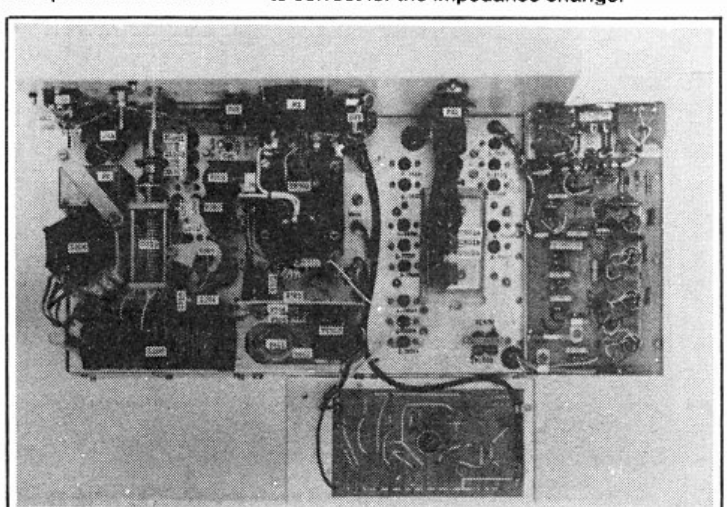


Figure 12: WRE Type 2 Transceiver — Rear.

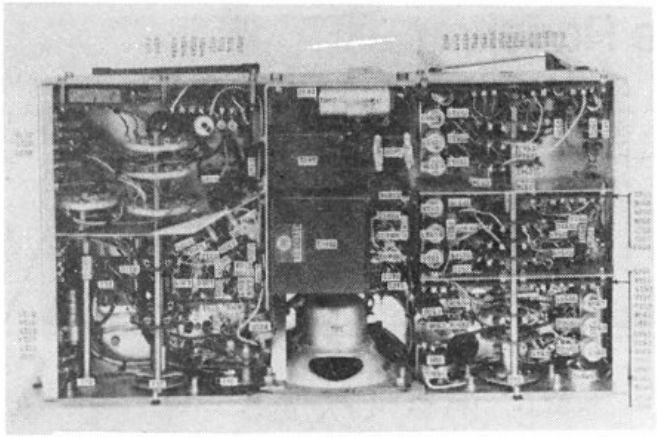


Figure 13: WRE Type 2 Transceiver — Under Chassis.

The Traeger units could transmit on frequencies in the range of 1.5 to 10 MHz and receive in a range of 1.5 to 16 MHz, plus the broadcast band. A disadvantage was that lug in units were still used to change transmit frequencies, or change receiver bands, as had been the case for previous Traeger all valve transceivers. Units Type TM2 and TM3 were similar except that the TM3 had the feature of a quick heat RF power valve which eliminated valve heater load on receive. RF power output of the TM3 could be as high as 25 watts with 14 volt battery supply.

Records updated in 1976 showed a mixture of WRE Type 2 transceivers, Traeger Type TM2 and TM3 transceivers and a few Traeger Type 59M10 transceivers. The 59M10 was an all valve unit and it is not clear how it was introduced or why it was still in the network at that late stage. (It is probable that the 59M10 units were surplus from one of the other Departments which provided support services to the range).

THE RECENT YEARS

A lot of water has passed under the bridge since those early days of the Woomera range. The range still carried out a few trials, but today it is a mere shadow of its former self. The HF radio change to single sideband was completed in 1978 some 28 years since the first Type 1 transceiver was developed. At that stage, time for our AM mobile radios ran out.

Planning for change of the whole range HF system to single sideband commenced as early as 1970, taking some eight years to complete. The mobile radio part of the network now consists of approximately 16 Codan SSB transceivers Type 7515 which have a rated output of 50 watts peak envelope power, somewhat of an improvement on the old AM units which had the equivalent single sideband powers of around three to five watts. The Codan 7515 can operate on up to 10 channels within the frequency range of two to 11 MHz. Aerials used are helical whips and mobile stations are expected to operate to other stations at distances up to 400 kilometres.

Future plans anticipate the use of a number of Codan Type 8525 transceivers which are state of the art synthesised SSB units with such features as automatic aerial tuning.

After 37 years of HF radio, our story ends. Particular reference has been made to the two early transceivers developed in our Establishment during the 1950-1960 era, a period in which the writer was closely associated with the radio communications of the range. To complete the picture for more recent times, much of the information recorded is the result of helpful discussions with other people who have been involved, such as John Langman, Vin Agius, Tony Bell and Geoff Fuss.

Looking back over those years during the peak of activity, we see a mobile radio network some 70 units strong, communicating over vast areas of uninhabited land in a range 2000 kilometres long. Where else in the world would such a network be found?

Most of those old AM transceivers have been disposed of now and one just has to wonder where they might now be gathering dust, or what other fate they might now have met.

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THE AUTHOR

Lloyd Butler is employed on developmental work in the Communications and Electronic Engineering Division of the Advanced Engineering Laboratory, Defence Science and Technology Organisation, Salisbury. During the period 1955-61 he was associated with the provision of HF and VHF radio communication facilities for the Woomera Range. As part of his work, he was responsible for the design and development of the WRE Type 2 HF transceiver discussed in this article.

Publication of this article has been approved by the Department of Defence.

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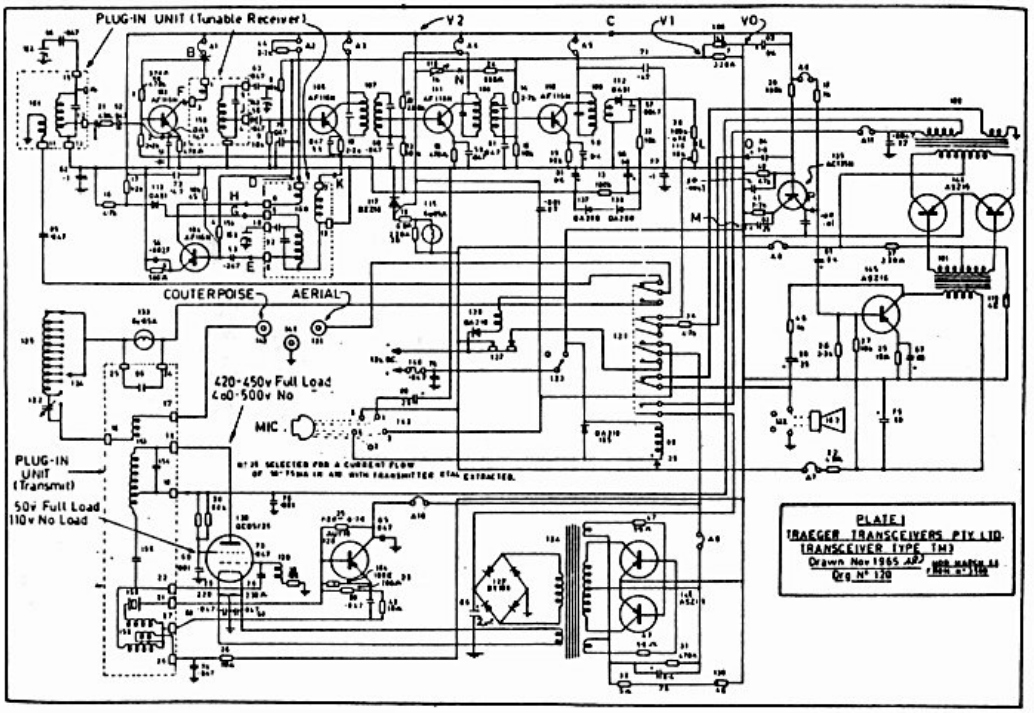

Figure 14: Traeger Transceiver Type TM3.

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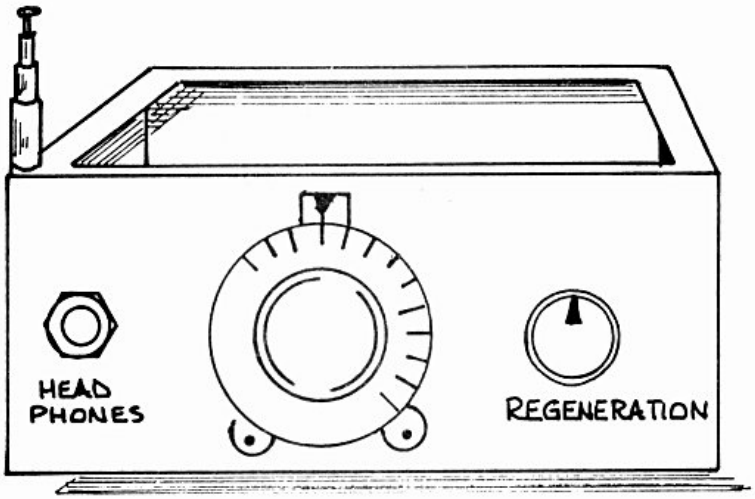
The dial has a 6:1 reduction and is available from suppliers such as Dick Smith Electronics stores. The headphones require an impedance of 2 kohms. It is better to connect the audio output to the pickup terminals of another radio receiver to amplify the audio output.
(Technical Editor's Note: This is a facility on old valve radios.)

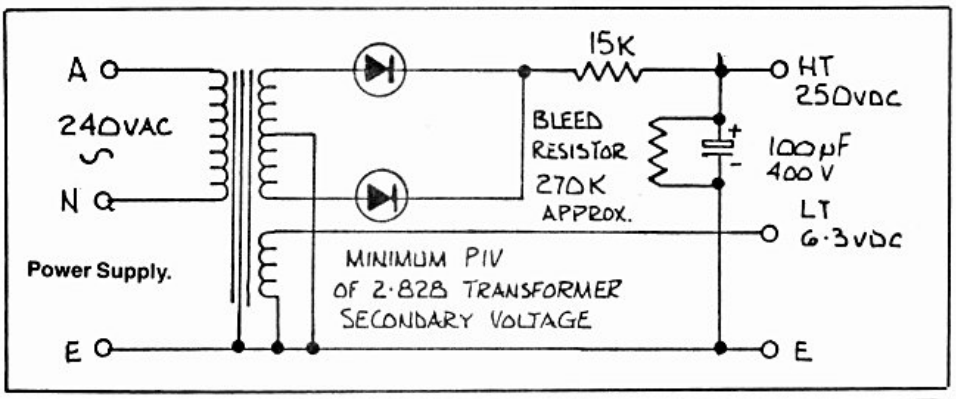
The valve is a 6EA8 with the pentode side only being used. Other valves like the EF89, 6AU6, etc, could be used instead, but the writer has not experimented with them.

Most of the components can be salvaged out of old radio or television sets. In the prototype, all parts were salvaged except the vernier dial.

The 8 uF 250 volt capacitor must not be leaky or the receiver performance will be degraded.

The regeneration control is advanced until the sensitivity is optimum. Ensure there is no external aerial connected to the receiver or there will be poor, or no, regeneration. The receiver noise should be a high hissing noise when the regeneration is working. If stations are not tuned in, reverse the connections to the regeneration coil socket. The 22 pF capacitor should be increased if there is not regeneration in all parts of the band.





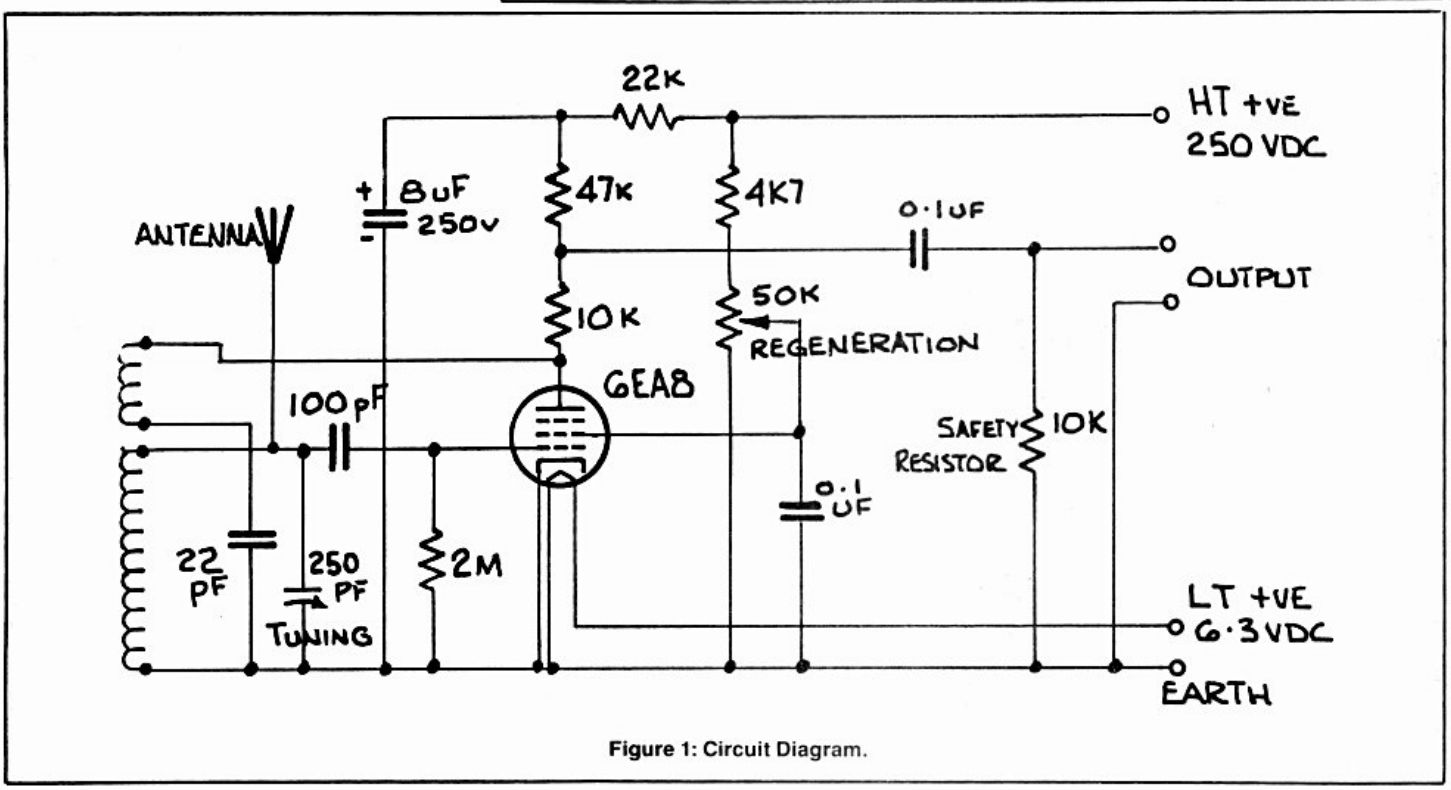
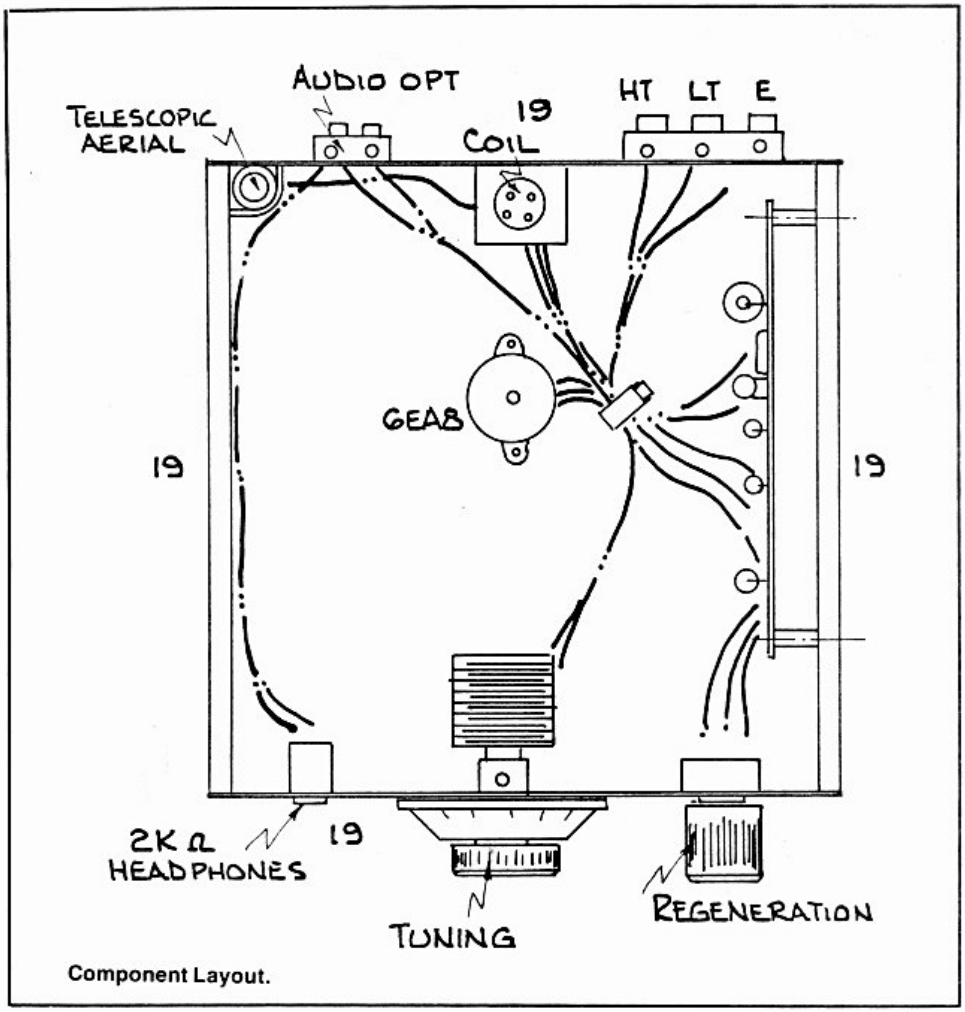
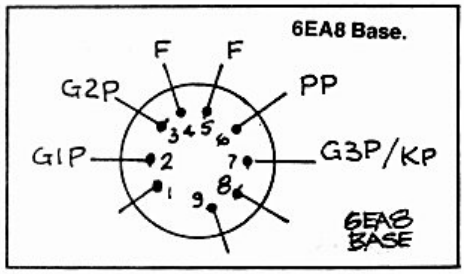
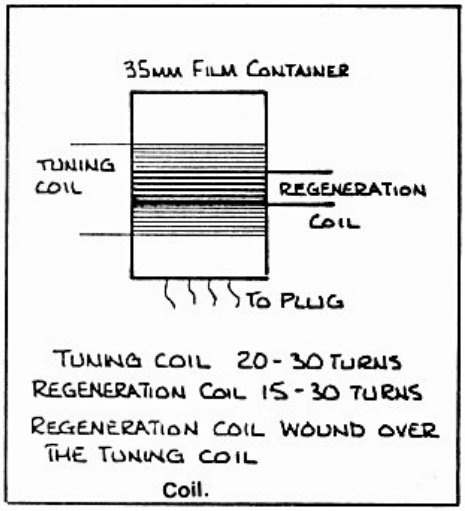


Figure 1: Circuit Diagram.



Component Layout.





Coil.

The 250 pF tuning capacitor can be 415 pF but the tuning range would be greater. Only one gang need be used out of the two or three on the capacitor. For the prototype, a wooden box was used, but if hand- capacity is a problem, the front panel should be metal and earthed.

The coil is wound on a readily available 35 mm plastic film container and is connected to a small four-pin plug. The receiver can receive AM, CW and SSB.

About 250 volts DC and 6.3 volts AC or DC are required to operate the receiver. This can be obtained from a power supply, which will also prove useful for other valve projects. The transformer has to be in good condition with no nasty smells which would indicate imminent problems. The filter capacitor should be new or in near new condition otherwise it may explode.

The diodes can be ordinary diodes salvaged from an old radio. The resistor values are given as a guideline — it may be necessary to vary them if the voltage is not in the region of 200-300 volts. ***Beware of high voltages. Never reach inside the receiver when it switched on.***

The receiver can be constructed on perforated circuit board. Valve receivers are simple, easy to build and work much better than receivers with the equivalent number of transistors.

(Technical Editor's Note: AC mains and high voltages should be handled with extreme caution. Do not work on such devices while they are switched on or plugged into the mains.)

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VK2RWI	53.850	53.250	Voice	Dural	Sydne
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VK2RWI	144.800	144.800	Packet	Dural	Sydney
VK2RPH	144.900	144.900	Packet	Hornsby	Sydney
VK2RLD	146.625	146.025	Voice	Razorback Range	Sydney
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VK2RAO	146.700	146.100	Voice	Mt Canobolas	Orange
VK2RMU	146.700	146.100	Voice	Milton	Ulladulla
VK2RPM	146.700	146.100	Voice	Middle Brother Mtn	Taree
VK2RAG	146.725	146.125	Voice	Somersby	Gosford
VK2RFS	146.750	146.150	Voice	Mt Mumbulla	Bega
VK2RTM	146.750	146.150	Voice	Mt Crawney	Tamworth
VK2RWG	146.750	146.150	Voice	Mt Flackney	Wagga
VK2RTZ	146.775	146.175	Voice	Mt Sugarloaf	Newcastle
VK2RCC	146.800	146.200	Voice	Needle Mt	Coonabarabran
VK2RIC	146.800	146.200	Voice	Parrots Nest	Lismore
VK2RLE	146.800	146.200	Voice	Heathcote	Sydney
VK2RTD	146.800	146.200	Voice	Mt Kendall	Tumut
VK2RGN	146.825	146.225	Voice	Goulburn	Goulburn
VK2RAB	146.850	146.250	Voice	Porcupine Res	Gunnedah
VK2RAW	146.850	146.250	Voice	Mt Murray	Wollongong
VK2RGF	146.850	146.250	Voice	Mt Bingar	Griffith
VK2RMB	146.875	146.275	Voice	Terry Hills	Sydney
VK2RAN	146.900	146.300	Voice	Mt Sugarloaf	Newcastle
VK2RRT	146.900	146.300	Voice	Boona Mount	Condobolin
VK2RGR	146.925	146.325	Voice	North Ryde	Sydney
VK2RNE	146.950	146.350	Voice	Mt Rumbee	Glen Innes
VK2RAN	146.975	146.375	Rtty/Vo	Mt Sugarloaf	Newcastle
VK2RWI	147.000	146.400	Voice	Dural	Sydney
VK2ROT	147.025	147.625	Voice	Paddington	Sydney
VK2RBM	147.050	147.650	Voice	?	Blue Mountains
VK2RWM	147.100	147.700	Voice	Grenfell	Grenfell
VK2RZL	147.100	147.700	Voice	Muswellbrook	Muswellbrook
VK2R	147.125	147.725	Voice	Portable	WICEN
VK2RWS	147.150	147.750	Voice	Chatswood	Sydney
VK2R	147.175	147.775	Voice	Portable	WICEN
VK2RBB	147.200	147.800	Voice	Byron Bay	Byron Bay
VK2RSD	147.200	147.800	Voice	Mt Cambewarra	Nowra
VK2RST	147.225	147.825	SSTV/Vo	Lane Cove	Sydney
VK2RNS	147.250	147.850	Voice	Asquith	Sydney
VK2RIL	147.275	147.875	Rtty/Vo	Sublime Point	Wollongong
VK2RTS	147.300	147.900	Voice	Lower Blue Mtns	Sydney
VK2RHR	147.350	147.950	Voice	Mt Gibraltar	Mittagong
VK2RAO	147.575	147.575	Packet	Mt Canoblas	Orange
VK2RAW	147.575	147.575	Packet	Mt Murray	Wollongong
VK2RCH	147.575	147.575	Packet	Bruxner Park	Coffs Harbour
VK2RPM	147.575	147.575	Packet	Taree	Port Macquarie
VK2RPN	147.575	147.575	Packet	Sugarloaf Range	Newcastle
VK2RPS	147.575	147.575	Packet	High Range	Southern Highlands
VK2RAG	147.600	147.600	Packet	Somersby	Gosford
VK2RT	438.025	433.025	Voice	High Range	Southern Highland
VK2RAG	438.075	433.075	Voice	Somersby	Gosford
VK2RMB	438.175	433.175	Voice	Terry Hills	Sydney
VK2RNT	438.175	433.175	Voice	Armidale	Armidale
VK2RUW	438.225	433.225	Voice	Port Kembla	Wollongong
VK2RWS	438.275	433.275	Voice	Chatswood	Sydney
VK2REE	438.325	433.325	Voice	Mount Marie	Taree
VK2RWM	438.325	433.325	Voice	Grenfell	Grenfell
VK2RUT	438.375	433.375	Voice	Kurrajong	Blue Mountains
VK2RUH	438.425	433.425	Voice	Hurstville	Sydney
VK2RRS	438.475	433.475	Voice	Chatswood	Sydney
VK2RPM	438.525	433.525	Voice	Taree	Port Macquarie
VK2RWI	438.525	433.525	Voice	Dural	Sydney
VK2RUM	438.625	433.625	Voice	New Lambton	Newcastle
VK2RAN	438.675	433.675	Voice	Mt Sugarloaf	Newcastle
VK2RSC	438.675	433.675	Voice	Mt Nardi	Lismore
VK2RTW	438.675	433.675	Voice	Willans Hill	Wagga
VK2RIL	438.725	433.725	Rtty/Vo	Sublime Point	Wollongong
VK2RTG	579.250	444.250	ATV	Kariong	Gosford
VK2RTN	579.250	426.250	ATV	Newcastle	Newcastle
VK2RTS	579.250	426.250	ATV	Lower Blue Mtns	Blue Mountains
VK2RTV	579.250	426.250	ATV	Chatswood	Sydney
VK2RTW	579.250	444.250	ATV	Willans Hill	Wagga

VICTORIA — VK3

VK3RHF	29.640	29.540	Voice	Mt Dandenong	Melbourne
VK3RTN	53.675	53.075	Voice	Lake Mountain	Melbourne
VK3RMH	53.900	53.300	Voice	Mt Dandenong	Melbourne
VK3REG	146.650	146.050	Voice	Donalds Knob	East Gippsland
VK3RGV	146.650	146.050	Voice	Mt Wombat	Shepparton
VK3RML	146.700	146.100	Voice	Mt Dandenong	Melbourne
VK3RNC	146.700	146.100	Voice	Mt Mitta Mitta	Corryong
VK3RON	146.700	146.100	Voice	Ouyen	Ouyen
VK3RBA	146.750	146.150	Voice	Mt Bunningyong	Ballarat
VK3RLV	146.800	146.200	Voice	Mt Tassie	Latrobe Valley
VK3RMA	146.800	146.200	Voice	Mildura	Mildura
VK3RMM	146.850	146.250	Voice	Mt Macedon	Melbourne
VK3RBS	146.900	146.300	Voice	Smeatons Hill	Ballarat
VK3REB	146.900	146.300	Voice	Mt Nowa Nowa	Bairnsdale
VK3RSH	146.900	146.300	Voice	Swan Hill	Swan Hill
VK3RWZ	146.950	146.350	Voice	Mt William	Grampians
VK3RGL	147.000	146.400	Voice	Mt Anakie	Geelong
VK3RNE	147.000	146.400	Voice	Mt Big Ben	Wodonga
VK3RGO	147.050	147.650	Voice	Mt Livingstone	Omeo
VK3RVL	147.050	147.650	Voice	Robinvale	Robinvale
VK3RWL	147.050	147.650	Voice	Mt Warrnambool	Warrnambool
VK3RCR	147.075	147.675	Voice	Montrose	Melbourne
VK3RPB	147.100	147.700	Voice	Mt Porepunkah	Bright
VK3RSG	147.100	147.700	Voice	Bass Hill	South Gippsland
VK3RWA	147.100	147.700	Voice	Ben Nevis	Ararat
VK3RGC	147.125	147.725	Voice	Montepellier	Geelong
VK3RCV	147.150	147.750	Voice	Mt Alexandria	Bendigo
VK3REM	147.150	147.750	Voice	Marimingo Hill	Mallacoota
VK3REC	147.175	147.775	Voice	Mt Dandenong	Melbourne
VK3RWG	147.225	147.825	Voice	Mt Baw Baw	West Gippsland
VK3RGS	147.250	147.850	Voice	Mt Fatigue	Toora
VK3RMK	147.250	147.850	Voice	Mt Kerang	Charlton
VK3RWP	147.300	147.900	Voice	Portable	WICEN
VK3RTY	147.350	147.950	Rtty	Mt Dandenong	Melbourne
VK3RBB	147.525	147.525	Packet	Mt Tassie	Gipsland
VK3RMC	147.550	147.550	RTTY/BB	Lilydale	Melbourne
VK3RPA	147.575	147.575	Packet	St Albans	Melbourne
VK3RPC	147.575	147.575	Packet	Mt Warrenheip	Ballarat
VK3RPL	147.575	147.575	Packet	Mt St Leonards	Melbourne
VK3RPM	147.575	147.575	Packet	Specimen Hill	Bendigo
VK3RPN	147.575	147.575	Packet	Mt Stanley	Wodonga
VK3RPW	147.575	147.575	Packet	Mt Wombat	Shepparton
VK3RPA	147.600	147.600	Packet	St Albans	Melbourne
VK3RPK	147.600	147.600	Packet	Broadmeadows	Melbourne

Call Sign	Frequency - MHz Output	Input	Mode	Site	Area
VK3RMU	438.075	433.075	Voice	Mt St Leonards	Melbourne
VK3ROU	438.225	433.225	Voice	Mt Dandenong	Melbourne
VK3RWE	438.275	433.275	Voice	Portable	WICEN
VK3RGU	438.375	433.375	Voice	Carrajung	Gippsland
VK3RBU	438.425	433.425	Voice	Mt Hollowback	Ballarat
VK3RAD	438.525	433.525	Voice	Mitcham	Melbourne
VK3RNU	438.525	433.525	Voice	Mt Stanley	Wangaratta
VK3RRU	438.525	433.525	Voice	Merbein	Mildura
VK3RWI	438.625	433.625	Voice	Portable	WICEN
VK3RWU	438.675	433.675	Voice	Mt William	Grampians
VK3RPA	439.200	439.200	Packet	St Albans	Melbourne
VK3RCU	439.275	434.275	Voice	Mt Macedon	Macedon
VK3RDU	439.425	434.425	Voice	Chessney Vale	Benalla
VK3RAU	439.575	434.575	Voice	Mt Anakie	Geelong
VK3RPU	439.725	434.725	Voice	Arthurs Seat	Melbourne
VK3RMZ	579.250	426.250	ATV	Bendigo	Bendigo
VK3RTV	579.250	444.250	ATV	Mt Dandenong	Melbourne
VK3RIC	1253.500	1241.500	Voice	Mt St Leonard	Melbourne

QUEENSLAND — VK4

VK4ROM	146.650	146.050	Voice	Cambells Park	Roma
VK4RTA	146.675	146.075	Voice	Longlands Gap	Atherton
VK4RAR	146.700	146.100	Voice	Mt Archer	Rockhampton
VK4RAT	146.700	146.100	Voice	Mt Stuart	Townsville
VK4RGC	146.700	146.100	Voice	Mt Tamborine	Gold Coast
VK4RMI	146.700	146.100	Voice	Mt Isa	Mt Isa
VK4RDD	146.750	146.150	Voice	Mt Mowbullen	Darling Downs
VK4RDT	146.775	146.175	Voice	Gammimbah	Toowoomba
VK4RBU	146.800	146.200	Voice	Mt Goonaneman	Bundaberg
VK4RSC	146.850	146.250	Voice	Maleny	Sunshine Coast
VK4RCH	146.875	146.275	Voice	Red Hill	Chinchilla
VK4RAI	146.900	146.300	Voice	Mt Crosby	Ipswich
VK4RGA	146.900	146.300	Voice	Calliope Range	Gladstone
VK4RCA	146.950	146.350	Voice	Mt Bellenden Ker	Cairns
VK4RBN	147.000	146.400	Voice	Mt Glorious	Brisbane
VK4RMK	147.000	146.400	Voice	North Mackay	Mackay
VK4RGY	147.100	147.700	Voice	Mt Boulder	Gympie
VK4RAG	147.150	147.750	Voice	Spring Hill	Brisbane
VK4RWI	147.150	147.750	Voice	Portable	WICEN
VK4RBS	147.250	147.850	Rtty	Mt Goonaneman	Bundaberg
VK4RQT	147.300	147.900	Voice	Mt Glorious	Brisbane
VK4RII	147.350	147.950	Voice	Mt Inkerman	Burdekin
VK4RBT	147.650	147.050	Rtty/Vo	Mt Cotton	Brisbane
VK4RBT	147.675	147.075	Rtty/Vo	Mt Cotton	Brisbane
VK4RSC	438.075	433.075	Voice	Buderim	Sunshine Coast
VK4RAT	438.225	433.225	Voice	Mt Stuart	Townsville
VK4RGC	438.225	433.225	Voice	Mt Tamborine	Gold Coast
VK4RWM	438.375	433.375	Voice	Ipswich	Ipswich
VK4RMU	438.425	433.425	Voice	Boveys Lookout	Mackay
VK4RBC	438.525	433.525	Voice	Mt Coot-tha	Brisbane
VK4RWI	438.625	433.625	Voice	Portable	WICEN
VK4RBU	438.675	433.675	Voice	Mt Goonaneman	Bundaberg
VK4RDB	438.700	433.700	Voice	Mt Mowbullan	Darling Downs
VK4RDU	439.275	434.275	Voice	Toowoomba	Toowoomba
VK4RIK	439.350	434.350	Voice	White Rock	Cairns
VK4RAT	579.250	426.250	ATV	Mt Stuart	Townsville
VK4RTV	579.250	444.250	ATV	Spring Hill	Brisbane

SOUTH AUSTRALIA — VK5

VK5RNC	146.650	146.050	Voice	Naracoorte	Naracoorte
VK5RSV	146.675	146.075	RTTY	Willunga Hill	McLaren Vale
VK5RMN	146.700	146.100	Voice	The Bluff	Port Pirie
VK5REP	146.800	146.200	Voice	Coolanie	Eyre Peninsula
VK5RHO	146.850	146.250	Voice	Houghton	Adelaide
VK5RMG	146.900	146.300	Voice	Mt Gambier	Mt Gambier
VK5RAD	147.000	146.400	Voice	Crafers	Adelaide
VK5RBV	438.425	433.425	Voice	Angaston	Barossa Valley
VK5RVP	438.525	433.525	Voice	Crafers	Adelaide
VK5RCN	444.250	426.250	ATV	Barunga Range	Clare Valley
VK5RTV	579.250	426.250	ATV	O'Halloran Hill	Adelaide
VK5RWH	1246.250	444.250	ATV	Willunga Hill	McLaren Vale
VK5ROH	1253.850	1241.850	Voice	Willunga Hill	McLaren Vale

WESTERN AUSTRALIA — VK6

Call Sign	Frequency - MHz Output	Input	Mode	Site	Area
VK6RAP	0.000	0.000	ATV	Roleystone	Perth
VK6RHF	29.630	29.530	Voice	Darling Scarp	Perth
VK6RSM	53.800	53.200	Voice	Tic Hill	Perth
VK6RSW	146.650	146.050	Voice	Bunbury	Bunbury
VK6RCA	146.675	146.075	Voice	Carnarvon	Carnarvon
VK6RAL	146.700	146.100	Voice	Albany	Albany
VK6RAP	146.700	146.100	Voice	Roleystone	Perth
VK6RWH	146.700	146.100	Voice	Derby	Derby
VK6RWR	146.700	146.100	Voice	Wickham	Wickham
VK6RTH	146.750	146.150	Voice	Tic Hill	Perth
VK6RAA	146.800	146.200	Voice	Mt Barker	Albany
VK6RTH	146.800	146.200	Voice	Tic Hill	Perth
VK6RWP	146.800	146.200	Voice	Karratha	Karratha
VK6REX	146.850	146.250	Voice	Tower Zero	Exmouth
VK6RKB	146.850	146.250	Voice	Kambalda	Kambalda
VK6RBY	146.900	146.300	Voice	Mt William	Bunbury
VK6RMN	146.900	146.300	Voice	Mt Newman	Mt Newman
VK6RPD	146.950	146.350	Voice	Bentley	Perth
VK6REE	146.975	146.375	Voice	Portable	WICEN
VK6RAK	147.000	146.400	Voice	Kalgoorlie	Kalgoorlie
VK6RAW	147.000	146.400	Voice	Mt Lathan	Wagin
VK6REE	147.000	146.400	Voice	Portable	WICEN
VK6RGN	147.000	146.400	Voice	Geraldton	Geraldton
VK6RNW	147.000	146.400	Voice	Port Hedland	Port Hedland
VK6RTY	147.050	147.650	Rtty	Roleystone	Perth
VK6RWC	147.100	147.700	Voice	Lesmurdie	Perth
VK6RIC	147.175	147.775	Voice	Portable	WICEN
VK6RCT	147.200	147.800	Voice	Cataby	Cataby
VK6RMS	147.250	147.850	Voice	Mt Saddleback	Boddington
VK6REN	147.300	147.900	Voice	Ocean Hill	Eneabba
VK6RBN	147.350	147.950	Voice	Busselton	Busselton
VK6R	147.575	147.575	Packet		Perth
VK6RTH	438.225	433.225	Voice	Tic Hill	Perth
VK6RUF	438.525	433.525	Voice	Roleystone	Perth
VK6RBN	438.675	433.675	Voice	Busselton	Busselton

TASMANIA — VK7

VK7RAD	146.625	146.025	Rt/Data	Mt Duncan	N.W. Tasmania
VK7RHT	146.700	146.100	Voice	Mt Wellington	Hobart
VK7RNW	146.750	146.150	Voice	Ulverstone	N.W. Tasmania
VK7REC	146.900	146.300	Voice	Snow Hill	Eastern Tasmania
VK7RAA	147.000	146.400	Voice	Mt Barrow	N.E. Tasmania
VK7RAF	147.250	147.850	Multi		Hobart
VK7RTV	426.250	444.250	ATV	Mt Duncan	N.W. Tasmania
VK7RIN	438.500	433.500	Voice	Barren Tier	
VK7RIT	438.525	433.525	Voice	Sandy Bay	Hobart
VK7RAB	438.550	433.550	Voice	Mt Arthur	N.E. Tasmania
VK7RTC	438.600	433.600	Voice	Mt Nelson	Hobart
VK7RAC	438.650	433.650	Voice	Table Cape	N.W. Tasmania
VK7RAE	579.250	444.250	ATV	Kelceystier	Devenport

NORTHERN TERRITORY — VK8

VK8RMS	146.650	146.050	Voice	Gove	Gove
VK8RDA	146.700	146.100	Voice	Karama	Darwin
VK8RCA	147.000	146.400	Voice	Alice Springs	Alice Springs
VK8RTE	147.000	146.400	Voice	Palmerston	Darwin

Number of repeaters listed = 248

These lists were printed from the WIA Data Base. Please forward any additions or amendments to the: Federal Technical Advisory Council (FTAC), C/- Federal Office, PO Box 300, Caulfield South, Vic. 3162.

WIA BEACON DATA BASE

Call Sign	Frequency MHz	Site
VK2RCW	3.699	Dural
VK5WI	28.260	
VK2RSY	28.262	Sydney
VK6RWA	28.264	
VK6RTW	28.266	Albany
VK8VF	28.268	Darwin
VK4RTL	28.270	Townsville
VK0CK	52.150	Macquarie Island
VK8VF	52.200	Darwin
VK2RBH	52.300	Broken Hill
VK6RTT	52.320	Carnarvon
VK2RHV	52.325	Newcastle
VK3RGG	52.330	Geelong
VK4ABP	52.345	Longreach
VK6RTU	52.350	Kalgoorlie
VK7RST	52.370	Hobart
VK1RCC	52.410	Mt Majura
VK0MA	52.418	Mawson
VK2RSY	52.420	Sydney
VK2RGB	52.425	Gunnedah
VK3RMV	52.435	Hamilton
VK4RTL	52.440	Townsville
VK4RIK	52.445	Cairns
VK5VF	52.450	Mt Lofty
VK6RPH	52.460	Perth
VK6RTW	52.465	Albany
VK7RNT	52.470	Launceston
VK8RAS	52.485	Alice Springs
VK6RBS	144.022	Busselton
VK4RTT	144.400	Mt Mowbullan
VK1RCC	144.410	Canberra
VK2RSY	144.420	Sydney
VK3RTG	144.430	Melbourne
VK3RMV	144.435	Hamilton
VK4RIK	144.445	Cairns
VK6RTW	144.465	Albany
VK7RMC	144.470	Newham
VK8VF	144.480	Darwin
VK8RAS	144.485	Alice Springs
VK3RGG	144.530	Geelong
VK3RGI	144.535	Gippsland
VK5RSE	144.550	Mt Gambier
VK6RPB	144.565	Port Hedland
VK6RTT	144.600	Carnarvon
VK5VF	144.800	Mount Lofty
VK2RCW	144.950	Sydney
VK6RPH	145.000	Perth
VK6RBS	432.066	Busselton
VK6RPR	432.160	Nedlands
VK1RBC	432.410	Canberra
VK6RTT	432.410	Wickham
VK2RSY	432.420	Sydney
VK3RTG	432.430	Melbourne
VK3RMV	432.435	Hamilton
VK4RBB	432.440	Brisbane
VK4RIK	432.445	Cairns
VK4RTL	432.445	Townsville
VK3RAI	432.450	Melbourne
VK6RTW	432.465	Albany
VK3RGG	432.530	Geelong
VK3RMB	432.535	Ballarat
VK4RAR	432.545	Rockhampton
VK6RPB	432.565	South Headland
VK6RPB	576.753	South Headland
VK6RBS	1296.198	Busselton
VK1RBC	1296.410	Canberra
VK2RSY	1296.420	Sydney
VK4RIK	1296.445	Cairns
VK6RPR	1296.480	Nedlands
VK6RPB	1296.695	South Headland
VK2RSY	2304.420	Dural
VK6RVF	10300.000	Roleystone
VK4RIK	10445.000	Cairns

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12th November 1987

VHF/UHF DISTANCE RECORDS

VHF / UHF DISTANCE RECORDS

Following receipt of record claims for new modes of operation and discussions with Federal Executive, FTAC has introduced new categories for distance records on the VHF/UHF bands.

Five categories of record have been recognised, as follows;

1. Home/portable category (the majority of claims),
2. EME category,
3. ATV category,
4. Mobile category, and
5. Digital modes category.

Existing records and new applications have been assessed and the record table is now as follows. Note the records recognised since the last published list in the 1986 callbook as indicated by the # symbol.

AUSTRALIAN VHF, UHF and SHF RECORDS.

Correct as at 11 Oct 87.

These lists were printed from the WIA Data Base. Please forward any additions or amendments to the: Federal Technical Advisory Council (FTAC), C/- Federal Office, PO Box 300, Caulfield South, Vic. 3162.

LEGEND

* - Australian record # - New record since last Callbook edition.

1. HOME/PORTABLE CATEGORY.

AUSTRALIAN CAPITAL TERRITORY

50 MHz		No claim			
144 MHz	#	VK1RH	to VK1ZJR	1/03/87	16.3 km.

NEW SOUTH WALES

50 MHz		VK2BA	to WB4OSN	6/04/84	15,068.8 km.
144 MHz	#	VK2ZRU	to VK6AOM	13/12/86	2,697.9 km.
432 MHz		VK2AHE	to ZL1BVA	27/01/81	2,260.2 km.
576 MHz		VK4ZRF/2	to VK4SH/4	11/12/81	255.4 km.
1,296 MHz		VK2BDN	to ZL1AVZ	9/12/82	2,132.7 km.
2,300 MHz		VK2ZAC/2	to VK2BDN/2	19/05/73	159.9 km.
3,300 MHz		VK2AHC/2	to VK2SB/2	16/01/77	114.1 km.
5,650 MHz	*	VK2AHC/2	to VK2SB/2ZND/2	12/04/75	114.1 km.
10,000 MHz		VK2AHC/2	to VK2SB/2ZND/2	12/04/75	114.1 km.

VICTORIA

50 MHz	*	VK3OT	to VP2VGR	17/03/81	16,663.3 km.
144 MHz		VK3YLR/3	to VK6KZ/6	23/01/80	2,784.2 km.
432 MHz	*	VK3ZBJ	to VK6KZ/6	23/01/80	2,715.9 km.
576 MHz		VK3AOT/3	to VK3ZKB/3	11/07/71	237 km.
1,296 MHz		VK3AKC	to VK7ZAH	17/02/71	439 km.
2,300 MHz		VK3ZHP	to VK7HL	12/01/85	427.3 km.
3,300 MHz	#	VK3KAJ/3	to VK3ZBJ	25/01/86	245.8 km.
5,650 MHz		No claim			
10,000 MHz	#*	VK3KAJ/3	to VK3ZBJ/3	8/02/86	261.9 km.

VHF / UHF DISTANCE RECORDS

QUEENSLAND

50 MHz		VK4AYX	to DL3ZM/YV5	18/03/81	15,582 km.
144 MHz	*	VK4ZSH/4	to JA7OXL	24/04/83	6,616.9 km.
432 MHz		VK4LC	to ZL3TAL	24/11/82	2,283.4 km.
576 MHz	*	VK4ZRF/4	to VK4ZSH/4	7/12/81	377.6 km.
1,296 MHz		AX4NO/4	to AX4ZT/2	12/04/70	402 km.
2,300 MHz		No claim			
3,300 MHz		No claim			
5,650 MHz		No claim			
10,000 MHz		VK4ZNC/4	to VK4ZSH/4	9/11/81	170.6 km.

SOUTH AUSTRALIA

50 MHz		VK5KK	to XE1GE	9/04/79	14,078 km.
144 MHz		VK5ZEE	to ZL1HH	15/01/86	3,458.8 km.
432 MHz		VK5NY	to VK7JG	21/05/85	995.0 km
576 MHz		VK5ZJL/5	to VK5QZ/5	28/12/69	314 km.
1,296 MHz	*	VK5MC	to VK6KZ/6	23/01/80	2,289.4 km.
2,300 MHz	*	VK5QR	to VK6WG	17/02/78	1,885 km.
3,300 MHz	#*	VK5QR	to VK6WG	25/01/86	1,885 km.
5,650 Mhz		No claim			
10,000 MHz		VK5CU/5	to VK5MW/5	30/12/71	95.7 km.

WESTERN AUSTRALIA

50 MHz		VK6BE	to JA8BP	30/10/58	8,833 km.
144 MHz		VK6KZ/6	to VK3YLR/3	23/01/80	2,784.2 km.
432 MHz	*	VK6KZ/6	to VK3ZBJ	23/01/80	2,715.9 km
576 MHz		VK6KZ/6	to VK6HK	16/01/83	196.4 km.
1,296 MHz	*	VK6KZ/6	to VK5MC	23/01/80	2,289.4 km
2,300 MHz	*	VK6WG	to VK5QR	17/02/78	1,885 km.
3,300 MHz	#*	VK6WG	to VK5QR	25/01/86	1,885 km.

TASMANIA.

50 MHz		VK7JG	to W5FF	17/04/82	13,765 km.
144 MHz		VK7ZAH	to VK7ZAZ	1/01/67	1,910 km.
432 MHz		VK7JG	to VK5NY	21/05/86	995.0 km
1,296 MHz		VK7ZAH	to VK3AKC	17/02/71	439 km.

NORTHERN TERRITORY

50 MHz		VK8GB	to 9Y4LL	10/04/82	18,665.4 km.
144 MHz		VK4ZSH/8	to JA7OXL	24/01/82	6,460.9 km.

2. EME CATEGORY

144 MHz		VK3ATN	to K2MWA/2	28/11/66	16,761 km.
432 MHz		VK6ZT	to K2UYH	29/01/83	18,726.4 km.
1,296 MHz		VK3AKC	to W2NFA	6/10/73	16,713 km.

3. ATV CATEGORY

432 MHz		VK7EM/T	to VK3ZPA/T	13/12/72	413 km.

4. MOBILE CATEGORY.

144 MHz	#	VK3KAJ/M	to VK6BE	25/ 1/86	2,226.5 km.
432 MHz	#	VK3KAJ/M	to VK6BE	25/ 1/86	2,226.5 km.

5. DIGITAL MODES CATEGORY.

no claims

OLD EXAMINATION PAPERS

The following papers are published courtesy of DOC. They are some of a series of yester-year papers which are published so readers may test themselves. Would the OTs still be able to pass with flying colours? How would the newcomers go with this type of exam?

COMMONWEALTH OF AUSTRALIA

"C"

POSTMASTER-GENERAL'S DEPARTMENT
AMATEUR OPERATOR'S CERTIFICATE OF PROFICIENCY

SECTION M (Theory) **APRIL 1955**

Time allowed — 2½ hours
NOTE — Seven questions only to be attempted

1 With the aid of diagrams explain two distinct systems of modulation suitable for use in amateur transmitters. List the advantages and disadvantages of both systems.

2 (a) Explain, using diagrams, how DC voltages for a transmitter may be obtained from an AC source.
(b) What is meant by "Voltage Regulation" as applied to a power supply? What measures should be taken to ensure satisfactory voltage regulations?

3 (a) Define the terms Amplification Factor, Plate Resistance and Mutual Conductance (or Transconductance).
(b) Describe the internal construction and explain the function of each element of a valve suitable for use as a second detector in a receiver of the superheterodyne type.

4 With the aid of sketches, explain fully the construction and principle of operation of a meter suitable for measuring radio frequency currents.

5 (a) Discuss the theory of operation of a microphone suitable for use in an amateur wireless station.
(b) By means of a diagram show how you would connect the microphone described to an amplifier.

6 Two resistors of 60 and 30 ohms respectively are connected in parallel across a 100 volt DC supply.
(i) Calculate the value of the circuit resistance.
(ii) What is the total current drawn from the supply.
(iii) Show on a sketch circuit how you would connect an additional resistor so that the supply current is doubled.
(iv) What is the value of this additional resistance?

7 (a) Explain, with the aid of a diagram, how grid leak bias may be obtained in a radio frequency power amplifier.
(b) Is it desirable to include some additional form of bias in a RF power amplifier when grid leak bias is employed? Explain.

8 (a) Define (i) Specific Inductive Capacity, (ii) Dielectric Strength, (iii) Dielectric Efficiency.
(b) Explain what is meant by the term time constant of a resistance-capacity network.

9 With the aid of curves indicate the current and voltage points on a half wave 7 Mc/s aerial. Show whether even or add quarter wave sections of resonant feeders are necessary to provide series tuning at the transmitter end when the aerial is to be (i) current fed (ii) voltage fed.

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COMMONWEALTH OF AUSTRALIA

"C"

POSTMASTER-GENERAL'S DEPARTMENT
QUARTERLY EXAMINATION PAPER FOR AMATEUR OPERATOR'S CERTIFICATE OF PROFICIENCY

SECTION K (Regulations) **APRIL 1958**

Time allowed — 30 minutes
NOTE — Three questions only to be attempted. Credit will not be given for more than three answers. All questions carry equal marks.

1 Indicate the regulation requirements regarding the sending of test signals from an amateur station.

2 (a) What is meant by "Third Party" in connection with operations of Amateur Wireless Stations?
(b) State fully the regulations regarding the handling of messages for "third parties" by Amateur Wireless Station licensees.

3 (a) Indicate the regulation requirements regarding the avoidance of interference to other services.
(b) For what purpose is a monitor used in an amateur station?

4 Name the "Q" Code abbreviations for the following: (a) Your note varies (b) Shall I send faster? (c) Who is calling me? (d) I am closing my station (e) Resume sending.

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COMMONWEALTH OF AUSTRALIA
POSTMASTER-GENERAL'S DEPARTMENT
AMATEUR OPERATOR'S CERTIFICATE OF PROFICIENCY

SECTION M (Theory) **APRIL 1953**

Time allowed — 2½ hours
NOTE — Seven questions only to be attempted

1 With the aid of diagrams describe the construction and principle of operation of a crystal microphone and show how it should be connected in a preamplifier circuit.

2 (a) Explain what is meant by the "Q" of a circuit.
(b) Use diagrams to show and explain how the selectivity of a series resonant circuit varies with the value of resistance in the circuit.

3 Three condensers of 3, 5 and 6 microfarads respectively, are connected is series across a DC supply of 1000 volts. Calculate
(i) the total capacity of the condenser combination.
(ii) the voltage appearing across each condenser.

4 Draw a circuit diagram and explain the theory of operation of a grounded grid RF stage for use in a receiver operating in the VHF range. What are the advantages of this type of amplifier compared to normal types when operated at these frequencies?

5 (a) Draw a circuit diagram of a triode Class C plate- modulated RF amplifier and its associated modulator and explain how modulation of the carrier wave is achieved.
(b) Describe the procedure to be followed in neutralising the RF amplifier if it is necessary to do so.

6 With the aid of diagrams explain three methods for obtaining grid bias for radio transmitting valves. List the advantages and disadvantages for each method.

7 (a) With the aid of a diagram explain how rectification is obtained in a full-wave rectifier circuit.
(b) Discuss the advantages and disadvantages of condenser input and choke input when used with high vacuum and mercury vapour type rectifiers.

8 Draw the voltage and current curves for a half wave Hertz aerial and explain why tuned feeders require a different method of tuning when connected to the centre as compared to the end of the aerial.

9 Describe the theory of operation of the "mixer" stage of a superheterodyne receiver and list the advantages to be gained by including a stage of tuned radio frequency amplification between the aerial and mixer stage.

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SOLAR ACTIVITY AND THE RISE OF THE NEW SOLAR CYCLE

Richard Thompson
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Man has been fascinated by the sun ever since he first walked the earth.

IT HAS BECOME evident during the last year that solar minimum was reached in September 1986, and that the new solar cycle has begun. Solar minimum is determined by the yearly average of the sunspot number falling to a low point. In this case, the sunspot number reached a trough of 12.4 in September and has been increasing since that date, reaching 21.9 in March 1987. There were bursts of solar region growth in October 1986, in April-May 1987 and again in July-September 1987. This region growth has produced the first few solar flares of the cycle but, as yet, has not produced a really outstanding event.

Before we look at solar activity during the year in detail, it is worthwhile to review some of the basics about the sun and the solar cycle.

THE SUN AND THE SOLAR CYCLE

Man has been fascinated by the sun ever since he first walked the earth. Initially, the fascination derived from the role of the sun in providing light, heat and the seasons. However, when detailed observations began with Galileo it was realised that the sun and its surface held many other fascinations.

The occurrence of sunspots was especially interesting. Sunspots are visible as dark regions on the sun contrasting with the brighter background photosphere. They vary widely in size, complexity and lifetime. Newly formed spots may be smaller than the angular resolution of most telescopes and last only a few hours. The largest spots may have areas of more than one thousandth of the entire visible disc of the sun. This corresponds to more than 10 times the surface area of the earth. Large spots may persist for periods of several months.

A typical spot has a dark centre, or umbra, surrounded by a less dark area called the penumbra. The boundary of the penumbra and the photosphere is usually quite sharp but is often irregular in shape. Spots nearly always form in groups which can be quite complex, often having overlapping penumbras.

Despite the frequent observation of sunspots, it wasn't until the middle of the 19th century that the sun's 11 year sunspot cycle was discovered. This cycle is defined by the variation in the occurrence of sunspots on the solar surface. During some periods, there are many spots visible on the surface whilst at other periods there are few or none at all. The time of peak visibility of sunspots is called solar maximum whilst the time of least spots is called solar minimum.

The period of the sunspot cycle shows up in the variation of a host of solar phenomena. For this reason it is better to talk about the 'solar cycle' rather than 'sunspot cycle'. However, the occurrence of sunspots is frequently used to define the solar cycle through a number called the sunspot number. Contrary to popular belief, this is not the actual number of sunspots visible on the solar disc. Rather, it is a number constructed by a mathematical formula taking in account the number of sunspot groups and the number of individual spots. The formula also contains a factor to make it consistent with historical observations which used different instruments and techniques. There are now better indices available than the sunspot number (eg the solar flux at a wavelength of 10 centimetres) but the sunspot number has the virtue of a longer series of consistent observation than any other index.

Figure 1 shows the variation of the sunspot number during the last five solar cycles and demonstrates the variability of the cycle in both amplitude, duration and shape. Although the solar cycle has an average length of 11 years there is a wide variation. Some cycles have been only 7.5 years long, whereas others have lasted up to 16 years. Each cycle tends to rise faster than it declines — the average rise time is 4.5 years whereas the decline averages 6.5 years.

Solar cycles also vary considerably in amplitude which is defined by the peak value of the sunspot number. During the period 1645 to 1715, called the Maunder Minimum, there was hardly any variation of the sunspot number. After this time there have been a number of cycles which reached a sunspot number of around 50 and the average cycle amplitude has been slightly above 100.

The last five solar cycles, shown in Figure 1, have been larger than this average. The smallest of the five was cycle number 20 which still reached a peak sunspot number of 111. The five cycles are notable in that they include cycle 19 which is the largest cycle ever recorded. The peak sunspot number for that cycle was 210. The last of the five cycles, cycle 21, was the second highest on record.

THE END OF THE LAST SOLAR CYCLE

The end of cycle 21 in September 1986, makes it appropriate to review its statistics. The following table lists some key facts.

Solar Cycle Number 21

Start of Cycle	June 1976
Peak of Cycle	December 1979
End of Cycle	September 1986
Peak Yearly Sunspot Number	165
Peak Monthly Sunspot NUmber	188

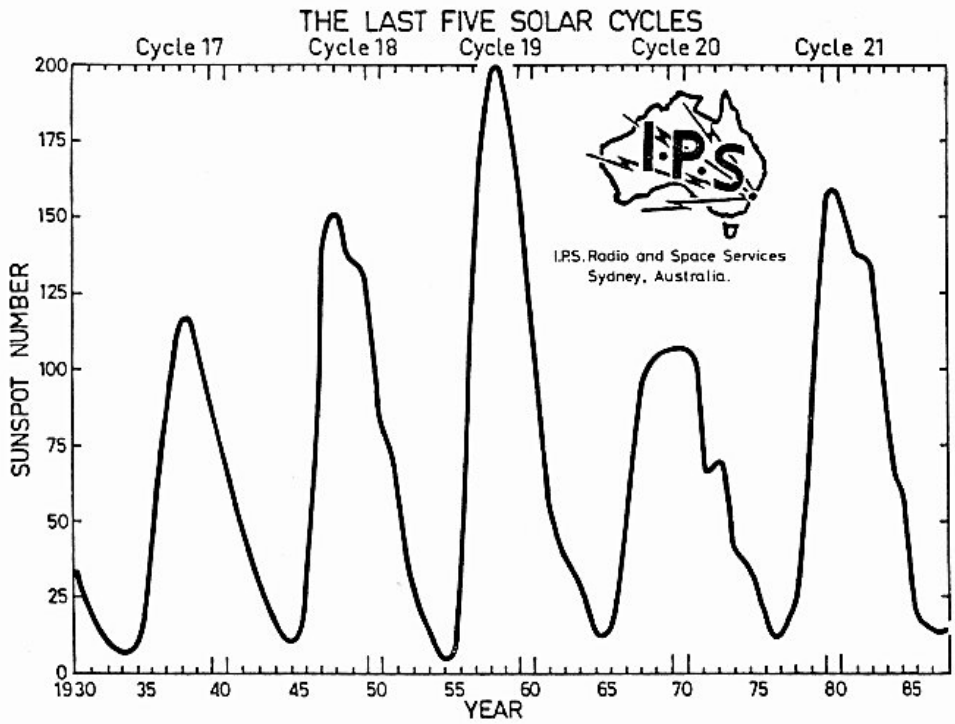


Figure 1: The variation of the yearly-averaged sunspot number over the last five solar cycles.

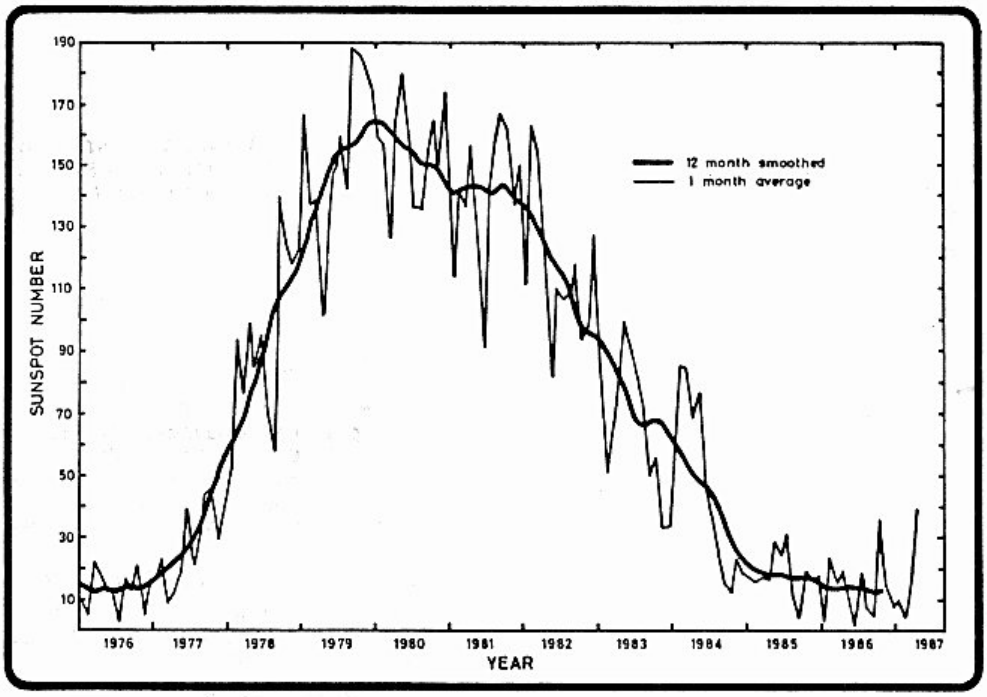


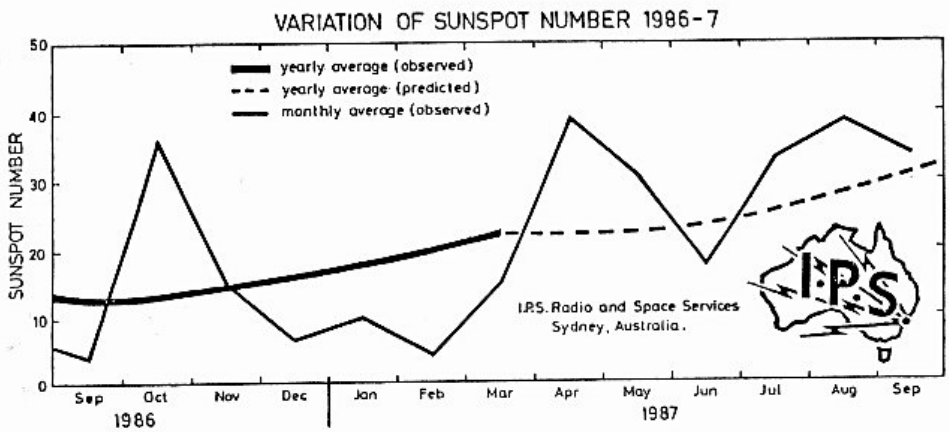
Figure 2: The variation of the sunspot number during the last solar cycle. The thick line is the variation of the yearly-averaged sunspot number whilst the thin line is the monthly-averaged sunspot number.

Figure 2 shows the variation of the sunspot number during cycle 21. The thick line, the sunspot number averaged over a period of one year, traces the general progress of the cycle. The thin line is the sunspot number averaged over a month and this indicates bursts of higher solar activity.

Figure 3: The variation of sunspot number since the last solar minimum. The thick solid line is the yearly-averaged sunspot number whilst the thin solid line is the monthly-averaged value. The dashed line is the estimated trend of sunspot number based on observed and predicted sunspot numbers.

THE RISE OF THE NEW SOLAR CYCLE

Figure 3 shows the variation of the monthly-averaged sunspot number and of the yearly-averaged sunspot number since solar minimum in September 1986. It is apparent that the monthly values have peaks in October 1986, in April 1987 and again in August 1987. These correspond to periods of region growth on the sun. As yet, there has been little flare activity from these regions. The most energetic solar flares are denoted "M" class or "X" class according to their power radiated at Xray wavelengths. There have been M class flares in October 1986 (one flare); and in April, May and July (two flares each month), August (nine flares) and in September 1987 (one flare). These flares were energetic enough to have caused a short-wave fade-out on some circuits at some frequencies but are unlikely to have had much effect on most circuits. As yet, there have been no really energetic flares (X class flares) which would have had a dramatic effect on shortwave communications.



How will this new cycle compare with previous cycles in terms of its amplitude? In the past few years, scientists have been discussing this question using a variety of techniques.

There is a wide range of predictions from a very low to a very high cycle. Out of this jumble of predictions there is one bright note. Of these predictions, those which use 'precursor' techniques tend to suggest that the cycle will be larger than average (ie the sunspot number will peak at more than 100). 'Precursor' techniques use observations of the behaviour of the sun in the declining phase of a solar cycle to predict the amplitude of the next cycle. A majority of scientists in the field agree that the precursor techniques are basically correct.

On the basis of predictions using the 'precursor' technique, IPS Radio and Space Services have adopted a value of 130 for the amplitude of the next solar cycle. This value is used in producing long-range frequency predictions for people wishing to set up communication networks for use into the next decade. The rapid rise in solar activity that we have seen in the past year suggests that this value is reasonable.

The next year of solar activity should enable this prediction to be confirmed or otherwise.

So the outlook for the new cycle is that it is likely to be larger than average! This will mean that there will be a wide band of frequencies open for HF communications. But cycles of strong activity also have disadvantages. Solar flares are more frequent and these produce shortwave fade-outs. Also, the material ejected by solar flares can produce terrestrial ionospheric/magnetic disturbances degrading communications, disrupting surveys for minerals and causing a host of other problems.

The next year should see a continuing rise in solar activity. IPS Radio and Space Services expect that the yearly-average sunspot number should reach 38 by January 1988 rising to 57 by June 1988. Along with the increase in sunspot number there should be an increase in the number of energetic solar flares (and shortwave fade-outs) and more frequent disturbances to the ionosphere and the geomagnetic field. Conditions for the next year will certainly be different from the rather unexciting solar minimum conditions experienced for the last few years.

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GOING PORTABLE

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There have already been many articles on DXpeditions to remote places and other articles on portable antennas — this is not intended to be either, but rather a simple description of how one amateur went portable.

Hopefully, it may be of interest to some, perhaps amusement to others, and even encourage others to "have a go" along similar lines and prepare them for some of the problems encountered along the way.

It is not my intention to carry out extensive analysis of equipment, although for ease of description, trade names are unashamedly used throughout.

Perhaps I should also mention at this point, that the keyword is *portable*, not mobile, operation. Having driven a cab in Brisbane traffic, and having wrapped the microphone cord around the steering wheel on more than one occasion, I have no desire to repeat the experience for pleasure. Neither do I see any great point in carrying on conversations on air whilst hurtling down the freeway at 100 km/h.

Well, it all began with a simple hand-held two metre unit. The "camping" equipment at the time was a 323 van, the back of which was utilised as rather minimal sleeping quarters for my wife and self. The simplest radio operation was carried out by plugging the hand-held into the cigarette lighter socket of the car and simply projecting a whip antenna out of the window.

This antenna system was quickly superseded by a "Slim Jim" which considerably improved performance and added to the comfort of the operator. In this case (and I have heard of many variations on this theme), the Slim Jim was made from television ribbon taped to a half-inch semi-circular hardwood section, a little longer than the actual antenna at the bottom, and which plugged into an approximately equal length of plastic covered metal tube, as used for curtain hanging, which in turn was clipped to the gutter of the vehicle, thus raising the actual antenna above the car and reasonably clear of car and metal tube. The bottom of the tube was either stuck into the ground or lightly tied to some convenient projection under the car.

There was no concern at this point regarding the added load on the car battery — the relatively small power output of this set (five watts at 13.5 volts maximum), and hence small drain, was not expected to drain the battery below that required to start the car, even after a few nights of operation without recharging. (Whether this assumption is correct would obviously depend on the degree of "earbashing" indulged in, but, in fact, the battery never showed any signs of distress with this mode of operation).

All of this was very satisfactory within limits, and most satisfying, particularly when all the locals on some outlying repeater came on to investigate the strange new call, concluding with a marathon "chinwag" to (hopefully) the enjoyment of all concerned.

Unfortunately, we did not always stay overnight on mountain tops, but rather creek banks and valleys, resulting in very severe limitations to operation on this frequency and mode. (As most would know, two metre signals do not propagate well through mountains).

About this time, it was decided to upgrade (?) the camping rig to a 4WD car and a small "pop-up" caravan, containing, amongst other necessities for existence, a small three-way (gas, 240 volts, 12 volts) refrigerator. This last item is specifically mentioned as it plays a major role in future events and planning. (Electrically, that is, the major role of keeping the liquid refreshments cold, should be understood! ! !).

The electrical equipment in the van, other than the traffic rear end lights, consisted of one internal light and the refrigerator (either one, but only one at a time), plugged by means of a very small television antenna-type plug and socket, into a 12 volt auxiliary circuit powered, in common with most vans, from the parent car. It was thus possible, with the van plugged in, to run either the internal light or the refrigerator off the car battery. However, and this point was stressed by the manufacturers, the refrigerator should be used on the 12 volt mode only with the car alternator working; ie, the car in motion, when it shouldn't be used on gas, otherwise the car battery would be drained in a very short time. (I have since determined that it takes four to five amps continuous).

No problems were experienced with VHF operations, the hand-held was simply used from the van; the Slim Jim adapted for attachment to the van roof, and a cigarette lighter-type socket was installed in the van on the auxiliary circuit for power. (Taking care to get the polarity correct). A variety of small openings were available for the antenna lead-in.

But, problems were being experienced with the refrigerators operation; the high current on 12 volts was causing definite signs of distress from the small plug connecting to into the auxiliary circuit, like melting and smouldering after lengthy periods of operation on the road. And the necessity of turning the refrigerator off when stopped for any length of time, meant at least partly raising the roof to gain access to the switch or plug in the van — whilst not difficult, a definite nuisance.

Two things happened at about this time which could be called synchronicity (a close interrelationship to those not familiar with Vonnegut and Synchronistic Philosophy of Events).

One — it was decided to include HF in the portable operation
and

Two — the bracket holding the van spare wheel on the frame of the van fell off.

The first event resulted in consideration of increased current drain on the car battery due to higher power used on HF and anticipated longer hours of operation, further resulting in a decision to install a separate battery in the van, exclusively for van and radio use. It could then be drained with impunity, knowing that a fully charged battery was isolated in the car, ready for starting commands next morning.

The second event appeared quite trivial, and the first handy welding shop took little more than a few minutes to weld the bracket back on the box frame. What wasn't so trivial was that it also welded all the van wiring running through the same box section into one solid lump of melted copper and burnt plastic. (I must admit the last sentence is writers licence, I have never actually looked into the box section, all I actually know is that all the wires were a dead short to the frame and blew every fuse whenever power was applied to the van).

As a complete rewire was warranted at this point, it was decided to use the opportunity to modify the circuit, not only to correct some of the earlier shortcomings, like melting plugs, but generally make the set up more convenient and certainly convenient for radio operation. To this end, the wiring was made more easily accessible and frequent use was made of junction boxes and connectors. The final circuit is included in Figure 1 ad shows a socket for the solar panel which, however, was not added until later.

Note also that some modifications were made in the car — a panel switch was installed enabling the auxiliary circuit to be isolated from the car and a heavy duty diode to prevent any back surge from the van battery in case it was left in circuit when the car starter was activated. The wiring would not stand the shock.

Now, either, both or neither battery could be switched into the van circuit as required. As a further protection for the car battery the van could be completely unplugged and still remain electrically functional.

In view of the heavy current, the HF radio power leads were clipped directly to the battery terminals and a 20 amp fuse incorporated.

Of course, it is still possible to leave all switches on and thus flatten both batteries, but how foolproof do you make a system? ? ?

A few points could be made here:

1 The switch on the car panel is not easy to overlook, once its purpose is known, nor is it easy to activate accidentally.
2 Both batteries are the same size and interchangeable.
3 There is a method where a relay, operated from the ignition circuit, switches on the refrigerator, thus ensuring its function only with the motor running. This was considered but, as it would necessitate a separate circuit again for the refrigerator (if the present auxiliary circuit is to retain its multi-purpose function), it was decided to be too complicated to be warranted in the circumstances.

All of this worked and is still functioning satisfactorily after several trips.

It was subsequently found that the van battery would not charge adequately from the car alternator with the refrigerator running. Also, it was found desirable to spend time in one place without having to run the car to charge the batteries, so some other means of charging had to be found.

To cut a long story short, and without getting into lengthy discussions on the relative merits of solar, wind or other means of electrical power generation, I will simply state that a solar panel was selected as the most promising to fulfill requirements. The panel is rated at 14 watts, measures 575 by 480 mm, including frame, incorporates a reverse blocking diode and, because of its relatively low output, is claimed to be completely self- regulating.

In practice, the panel is bolted to plastic angles attached to the ventilator cover on the van roof, plugs into the socket provided, and remains in circuit until we return home.

At home all the equipment is removed from the van, the panel is installed on similar brackets on the house roof, and plugs into a permanent down-lead connecting it to the same battery and set, now installed in the shack ready to go on air, courtesy of "Old Sol".

Perhaps I should mention that this emphasis on solar operation at home is not just parsimony (although that is an important point although I do have and operate mains equipment occasionally), but, having acquired the solar equipment, I am curious to discover, in practice, how often I will run out of power. So far, and despite of powering the HF and VHF rigs and a VHF amplifier at home, and the radio gear (HF and VHF), van lights and other odds and ends like shavers, the odd soldering iron, etc, on the road, I have run out of solar power only once, and that was when the refrigerator was accidentally left on the van battery for a couple of hours (the car battery was still okay, of course). The weather was part cloudy at the time and it was several days before I was confident enough in the battery to make but the briefest of QSOs.

It is interesting to note, as the battery declines, the HF transmitter is first to become inoperable, evidenced by poor tone and wild fluctuations in frequency. At this point, the battery still retains sufficient power to operate lights, the set on receive and most other small items of equipment for a considerable period of time.

Now the radio equipment — VHF has remained essentially the same. I see little point in upgrading as my personal experience strongly suggests that

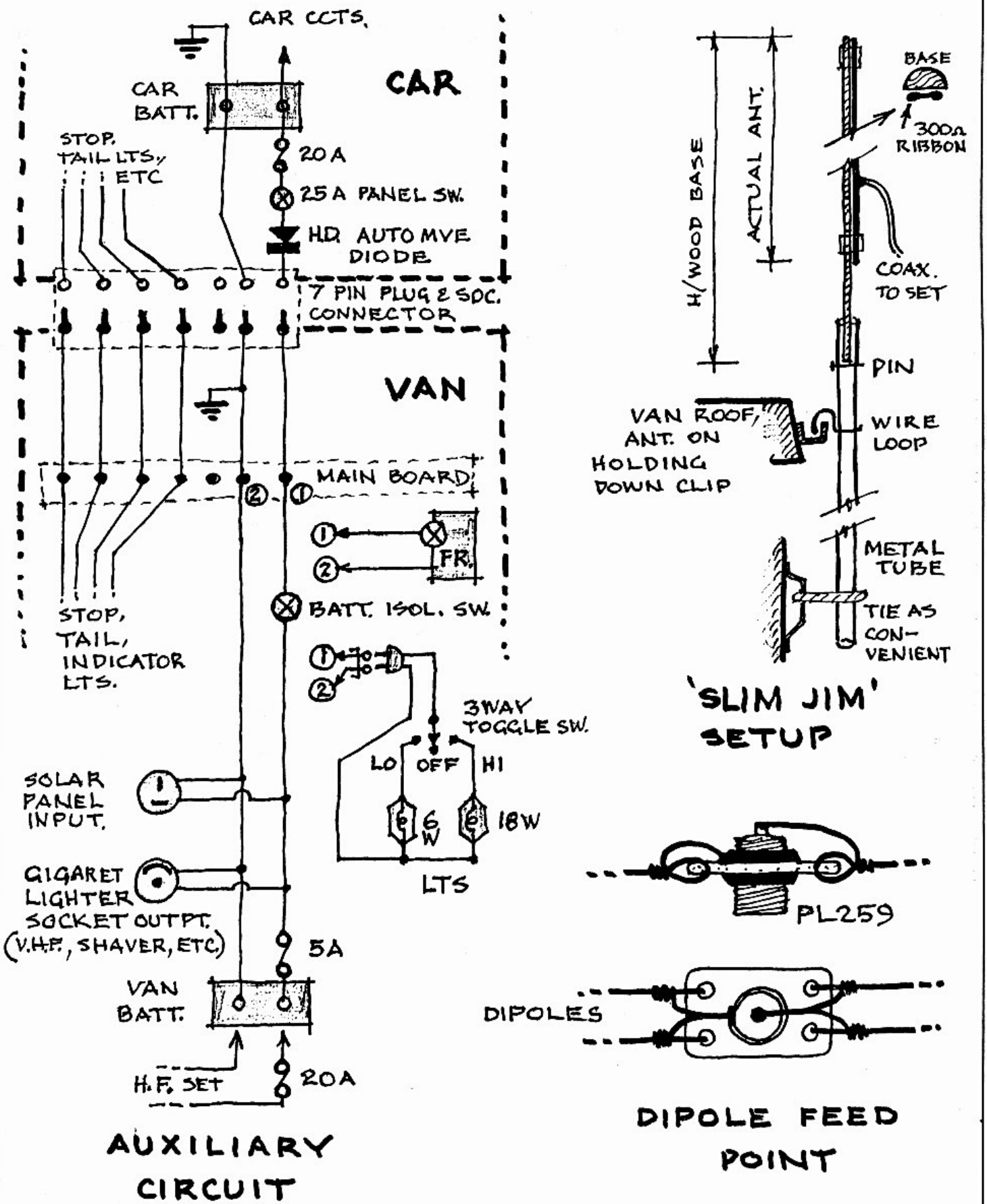

CAR CCTS.
CAR
CAR BATT.
STOP, TAIL LTS, ETC
20A
25A PANEL SW.
HD AUTOMVE DIODE
7 PIN PLUG & SOC. CONNECTOR
VAN
MAIN BOARD
FR.
BATT. ISOL. SW.
STOP, TAIL, INDICATOR LTS.
3WAY TOGGLE SW.
LO
OFF
HI
6W
18W
LTS
SOLAR PANEL INPUT.
CIGARET LIGHTER SOCKET OUTPT. (V.H.F., SHAVER, ETC.)
5A
VAN BATT.
H.F. SET
20A
AUXILIARY CIRCUIT
H/WOOD BASE
ACTUAL ANT.
BASE
300Ω RIBBON
COAX. TO SET
PIN
VAN ROOF ANT. ON HOLDING DOWN CLIP
WIRE LOOP
METAL TUBE
TIE AS CONVENIENT
'SLIM JIM' SETUP
PL259
DIPOLES
DIPOLE FEED POINT

Figure 1.

power is of relatively little importance while the location is everything, and I have found on many occasions that even a few metres in the height of the antenna can make all the difference.

The HF rig is a TS130SE with an AT120 antenna tuner. An RF power meter has been used at home to establish an approximate correlation between power output and final IC current (available on the set meter) for reference purposes. This set uses 0.7 amps on receive and a maximum of 19 amps on transmit. The 19 amps sound pretty horrific for battery operation but, in practice, I doubt if I ever come anywhere near it except on very rare occasions.

Firstly, it only occurs at maximum output and then only on the peaks for SSB. On CW (my favourite, and therefore preferred mode), the situation, as far as I am concerned, is much better. I rarely use more than about 20 watts when portable, and have made world-wide contacts on this even with temporary antennas. This takes about five amps out of the battery with key-down. For local QSOs, I make do with 10 watts or less and this requires only three to four amps. This certainly sounds much better than the 19 amps shown on the specifications! (Perhaps I have a strange sense of humour, but I get a great kick out of working stations on the other side of the world on 10 watts and a dipole three metres up strung between two trees, whilst they are using 500 watts of power into a multi-element beam 30 metres up, particularly if we exchange the same report!).

On "tour" I use a modified "cheapie" key, purchased for around $2.50, but strengthened and fitted with an improved bearing system. It tends to slide about on the table a little, but I am told my CW is adequate. At home a heavier key is used.

For several trips, a VHF SSB set was carried, an IC202E, but contacts made on this mode did not warrant its continued use — not a single one, in fact!

Last, but not least — the antennas. On VHF the "good old Slim Jim" is still doing good service and needs no further comment. For those interested, the dimensions have been published frequently in AR over the years.

On HF I carry two systems — one very portable but dependent on suitable trees at the site; the other, a little more cumbersome but self-supporting, and dependent on suitable soil.

The first system consists of two dipoles — one for 80 and 20 metres, fed from a common centre point and both cut to favour the CW end of the band. Both give adequate coverage with the ATU. They are made from disposal ex- Army field telephone wire, purchased from a junk-yard — 50 cents for a sugar bag full of tangled mess! This wire, once resurrected, is very light, strong and durable, and handles well in the field.

This system obviously depends on finding suitable and suitably spaced trees for supports, but this is usually not as difficult as it may first appear as there is quite a margin which can be made up with rope, string and a little ingenuity. An ability to climb trees is a definite advantage.

At times, only the 80 metre dipole is used with the 20 metre wires simply being left suspended in neat coils without any apparent ill effects.

I have repeatedly been pleasantly surprised at how effective this system is, even at only some two to three metres above ground and have many 599 reports to verify it!

Perhaps a 40 metre dipole, doubling on 15 metres, would be good value, but so far has not eventuated.

The second system is a five-band commercially-made trapped vertical ground plane antenna. It disassembles into manageable lengths, and although not as portable as a coil of wire, does fit into the van, along with a couple of fishing rods. It does depend, however, on soil soft enough to enable the main mounting peg (approximately one metre of 38 mm pipe) to be hammered into it to provide a good ground plane electrically. (The antenna fails to load on 80 and 40 metres if the last condition is not met).

In practice, beach sand, in the first line of dunes (a camping spot much to our taste) appears to work very well, particularly if a few buckets of sea water is poured around the peg to improve conductivity.

Guys are essential but three minimal supports are all that is required in all but the strongest winds. (In which case we would be packing up anyway). Some small tent pegs and precut lengths of synthetic rope serve very nicely!

It is possible to erect the vertical single-handed in about 10 minutes, but an extra pair of hands at the actual lift are very helpful, though not essential. The performance of this system seems to vary over a wider range, most likely I suspect, due to its dependence on ground plane conditions.

One problem experienced with the vertical — in coastal locations, and with strong on-shore breezes, there is a salt build up on the bottom of the traps. This, coupled with a heavy dew next morning has been known to do very funny things to the SWR. The only solution found so far has been to lower the antenna and clear away the salt.

A separate earth is used wherever possible. This consists of a 12 mm diameter copper rod two-thirds of a metre long, set into the ground as near to the van as possible.

The same length of coaxial cable, fitted with a PL259 plug at each end is used for either system. The dipoles are attached to a perspex plate fitted with a PL259 socket, whilst a similar socket is a standard fitting on the vertical. As any astute reader will notice, if not asleep by now, both systems depend on certain natural conditions being available (trees, suitable soil, etc) so what would happen if we were to camp on a barren rocky outcrop? Well, all I can say so far this hasn't happened and I have managed to get on air somehow from just about anywhere we have stopped for any length of time. Perhaps such inhospitable country for antennas is also unattractive to us, who knows? Anyway, a barren rocky outcrop may well be a marvellous VHF location!

Well, that is the end of the story for now. I feel the system has arrived and we are planning the next trip without considering any further modifications to the equipment — nor were there any repairs to be done at the end of the last trip.

Now the gas bottle and water tanks have been filled and soon we hope to be off again, so hope to see you all on the air — *portable*.

ar

GOING PORTABLE — AGAIN

It is now several months since the original article was written and, a further trip has been undertaken. Consequently, a few additional comments may be in order.

Basically the trip took us west through Longreach and Winton, to the coast at Townsville, north to Atherton, and back down the coast to Nambour with, of course, many detours along the way.

No trouble was experienced with the equipment, and the refrigerator was left on the van battery only once (human error), taking the solar panel three days to bring the battery back to a reasonable state of charge.

The two-metre hand-held was virtually dead-weight, and was useful on only one occasion to listen to the WIA news broadcast via the Rockhampton repeater one Sunday morning, when about 50 kilometres from that centre. In the main, we simply did not get close enough to the major centres to make use of the repeaters, and looking for the odd simplex QSO in the middle of nowhere makes the proverbial needle-in-the-haystack a "cinch."

Inland from the coast the vertical HF antenna was also found to be almost useless. The ground was bone-dry and too rocky for the ground peg. One notable exception was at Lake Victoria, near Biloela, where, once through the dry surface crust, the peg entered soft gooey mud. This apparently provided an excellent ground plane and gave excellent results on-air.

Even though the west is not noted for its timber, sufficient trees or shrubs in some form were usually found to string up the wire dipole in some fashion, usually with adequate to good results. Notwithstanding, in the middle of a vast empty plain north of Winton, two lonely, stunted trees were found, just the right distance apart for the 80-metre dipole!

On the coast the choice became wider, but the dipole still seemed to be favoured for one reason or another.

(Incidentally, I would venture to suggest that the dipole, even under very adverse conditions, would still give better performance than gutter-mounted HF antennas.).

QSOs on 80 metres were never a problem in the evenings but 20 metres seemed in "poor shape" and little new DX was worked on this trip. Some notable QSOs however, were a couple of VK3s, a maritime mobile station in Noumea Harbour, and a couple of stations near Denver, USA, all on a dipole not two metres above ground, at Porcupine Gorge.

I have also been told that using an automotive battery in my circumstance is not advisable, that the relatively slow charge and discharge rates would quickly make it unable to hold any charge at all. However, I have been using it in this manner for a couple of years now without any apparent ill-effects, but would be interested to hear from anyone more knowledgeable about batteries than I!

ar

REMEMBER

When inquiring about products published in AR always mention where you read of the product.

MAINS POWER SUPPLY FOR BATTERY OPERATED RECEIVER

Jack Townsend VK5HT
25 Goose Avenue, Glenelg North, SA. 5045

Built in a wooden leatherette covered case, it produced magnificent sound.

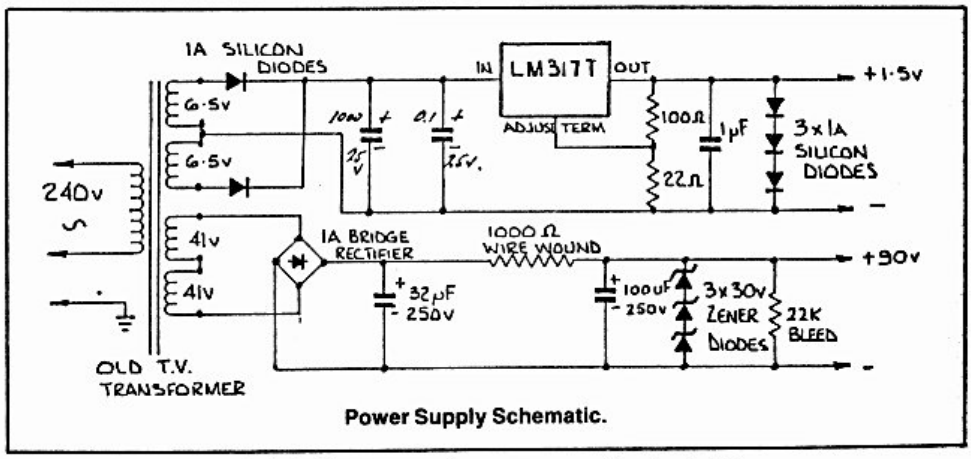
A relation of my wife's had an old HMV Portable model B61B receiver. By todays standards it was colossal namely 390 mm wide, 310 mm high and 135 mm deep. It was built in a wooden leatherette covered case around a Rola 210 mm speaker. It had belonged to his late father. For sentimental reasons he could not part with it. Besides it used to produce magnificent sound.

The tube line-up was a 1T4 RF amplifier, 1R5 converter, 1T4 IF amplifier, 1S5 diode detector, AVC and audio amplifier and a 3V4 power amplifier was used to drive the speaker.

The original power supply was one Eveready No 745 1.5 volt battery and two Eveready No 482 45 volt batteries. It used full sized components. For example, the IF cans were about 90 mm high. All resistors and capacitors were normal size, typical of the post-war era of the late 1940s. There was ample space to install a power supply in the area formerly occupied by the batteries.

A VISIT TO THE JUNK BOX

Most of the components came from my junk box except for the LM317T regulator and the bridge rectifier. The transformer was from an old television set and had four separate secondary windings, two at 6.5 volts and two at 41 volts.



Power Supply Schematic.

The value of the voltage divider resistors connected to the 'adjust' terminal of the LM317T was determined by experiment. As a precaution against over voltage three silicon diodes were connected in series across the 1.5 volt filament output to limit at 1.8 volts. Likewise three 30 volt zener diodes were connected across the 90 volt HT supply to maintain a reasonable steady HT.

The filament drain is only 300 mA and the HT approximately draws 25 mA. Consequently there is very little heat generated and the LM317T is equipped with only a small heatsink. The small components were mounted on a modern resistor strip purchased from a well-known Australian electronics supplier.

The result was well worth the effort and the old Portable is now operating from the AC mains.

ar

Try This!

VERTICAL VEE ANTENNA

Maurie Dewhurst VK5PMD
4 Hawke Street, Linden Park, SA. 5065

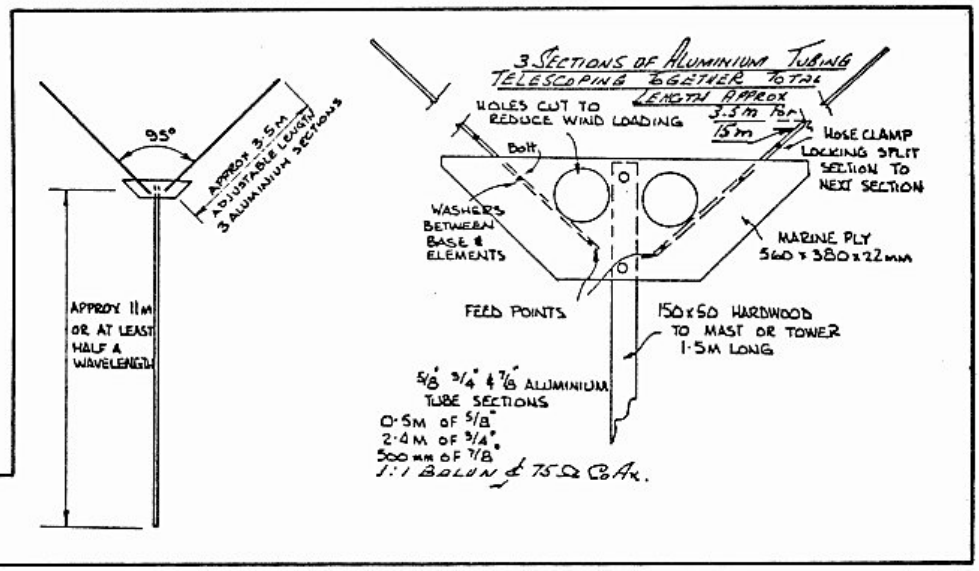
I do not claim to be the 'inventor' of this antenna. I heard Leo VK2NHT, describing it on air and how he obtained the idea from the 'rabbit's ears' on his television set. Being Number One sceptic, I decided to construct such an antenna.

The antenna is a vertical Vee and it is attached to the top of an 11 metre *Silky Oak* tree. On the first test with Eddy VK5ARL, who had previously reported me to be 5x3 on my standard 15 metre dipole, located 11 metres above ground, when connecting the Vee, he surprised me by giving a 5x8 signal report.

On 15 metres the SWR was 1:1 across the Novice segment. I have not climbed the tree to make any adjustments. I was curious regarding 10 metres and with the tuner in line it was found that this antenna could be matched on this band.

The transceiver I am using is a TS120V and the tuner is a FC-700.

ar



Details of the construction of VK5PMD's antenna on information gathered from VK2NHT.

PAPER 3 — THE FUTURE OF AMATEUR RADIO — OPTIONS

by the Future of Amateur Radio Working Party

The Working Party membership includes:
Ron Henderson VK1RH
Gordon Bracewell VK3XX
John Aarsse VK4QA
Stephen Phillips VK3JY

BACKGROUND

The Future of Amateur Radio Working Party was set up by the 1986 Federal Convention and directed by the Executive to, amongst other things, report on "the operating and technical requirements of amateur radio in the near future (next five years) and more distant future (out to say 15 years)".

Following the 1987 Federal Convention where guidance was given to the Executive on the Future of Amateur Radio, the Executive further requested the Working Party "to produce a number of discussion papers coupled with a general review of licencing grades and operating privileges existing in the Amateur Radio Service".

The Working Party to date has produced three discussion papers, namely:

* The Future of Amateur Radio (AR. . .86)
* Frequency Bands and Emissions (AR. . .86)
* A Proposal to Restructure Amateur Radio Licencing (AR. . .86)

These papers have explored many facets of amateur radio and have provided the Working Party with an adequate understanding to now identify the options open to the Amateur Radio Service.

AIM

The aim of this review paper is to identify all feasible options and expose their strong points and weaknesses.

OPTIONS

The Working Party believes the feasible options are limited to the following:

a. Restructure as an 'elitist' service
b. No change
c. Provide more entry points retaining Novice as the lowest grade and unrestricted as the highest licence level
d. Introduce a lower level than Novice using type approved equipment
e. Widen the span with an increased number of entry points ranging from very simple lower grade licences to a more difficult advanced grade (USA or Japanese style)
f. Remove all theory examinations and provide two amateur licences, namely a VHF/UHF licence and an all band licence gained via a Morse test
g. Remove all examinations and provide a single amateur licence

It should be noted this options list begins with the most demanding situation and progresses through a series with lessening requirements to end in an essentially CB situation.

There are variations associated with these options and they include:

a. Elimination of the Morse code test
b. Removal of annual licence fees
c. Seeking more amateur frequency allocations
d. Challenging the Japan/Australia reciprocal agreement on discrimination grounds
e. Level of regulation

Because these variations influence many of the options they will be examined in some detail now before the options are considered.

MORSE TESTS

The earlier paper *A Proposal to Restructure Amateur Radio Licencing* considered the requirement for Morse testing and concluded that, for the present, the Morse test speed should determine the frequency band allocations for each grade of licence. This acknowledges the international requirement for more proficiency to operate below 30 MHz.

Should the ITU at WARC 92 change the applicable Radio Regulations to delete Morse code proficiency, the appropriate adjustments can readily be made to the proposed licence structure.

LICENCE FEES

In these present times of "user pays" for government services, the possibility of removal of amateur licence fees appears a forlorn hope. Even so, it is current WIA policy to press for a licence currency period in excess of one year at pro-rata reduced administrative charges, and this matter has been favourably received in principle by DOTC.

AMATEUR FREQUENCY ALLOCATIONS

Two aspects of amateur frequency allocations are applicable to all options. Firstly, to seek additional spectrum at WARC 92 and, secondly, to exchange some larger shared allocations at UHF for, be it smaller, exclusive allocations.

The first aspect is influenced by much current and some out-of-date WIA policy; all due for review at the 1988 Federal Convention. For the purposes of this paper, it will be assumed the amateur movement, through the IARU and national authorities, will seek additional spectrum at WARC 92 (if only to maintain what we already have!).

The second aspect concerning exclusive allocations, is equally supported by IARU regions and will also be assumed the international amateur position. Again, this matter needs clarification nationally at the 1988 Convention and internationally at the 1988 Region 3 Conference in Seoul.

JAPAN/AUSTRALIAN RECIPROCAL AGREEMENT DISCRIMINATION

It has been suggested the current Japan/Australia reciprocal licence agreement discriminates against the Novice class of Australian licencee. The Japanese licencees, holding national qualifications lower in theory level than the Australian Novice licencees, are accorded access to all Australian VHF/UHF bands and emission modes at Novice power levels.

It will be necessary to establish whether these circumstances constitute a genuine act of discrimination and if the opinion supports that proposal, action will need to be taken to eliminate the discrimination.

LEVEL OF REGULATION

Over the past few years, the Amateur Radio Service has moved from a tightly regulated service under the old and dated Wireless Telegraphy Act to the current reasonably de-regulated situation under the Radiocommunications Act. A number of older amateurs have decried this change, losing as they have the 'warm security of the Regulations". Unfortunately, the natural accumulation of legislation may resurrect a number of constraints, particularly should existing rules not control abuse.

An accompanying feature has been the demise of the Amateur Advisory Committees. However, there are emerging trends to replace them with regional WIA/DOTC joint committees to improve liaison and self-regulation of the service.

Some of the options above rely heavily upon a detailed and strong regulation base covering frequency band segments and permissible emissions and powers. Other options need very little regulation and may lead to frequency anarchy in this present day and age.

The fine balance presently achieved, between constraining over regulation and under regulation with attendant abuses, must be retained. One feature of the Radiocommunications Act is the ability of the Department to gazette specifications as to EMC/EMI for equipment using the electromagnetic spectrum.

EXAMINATION OF OPTIONS

In this part of the paper, the options identified earlier will be examined for their strong points and weaknesses.

RESTRUCTURE AS AN ELITIST SERVICE

The simplest was to create an elitist amateur service is to delete the Novice (and combined) licence grades and to add an Advanced class of licence awarded for additional achievements in theory (more difficult examination), Morse code (faster speed test) or practical operating (practical examination), or any combination of these three.

The Advanced class licencee could be given sole access to the WARC 79 bands plus any new bands gained at WARC 92. The creation of an advanced VHF/UHF licence class is not seen as according with these elitist guidelines.

STRONG POINTS

Satisfies a need perceived by some amateurs, provides an incentive to upgrade and keeps "unskilled black box operators" out of an experimental hobby.

WEAKNESSES

It is not supported by the majority of amateurs. It may place much useful spectrum out of reach of all but the select few and is not moving with the times in acknowledging the near universal use of commercial transceivers. It would be difficult to administer the practical test, also the Morse test due to the decline in number and quality of higher speed

Morse examiners. The option would not be popular with VHF/UHF operators who are equally well skilled as their elitist HF counterparts except for Morse code qualifications.

NO CHANGE OPTION

Retain the existing Novice, Limited, Combined and Unrestricted licences with the current examination requirements.

STRONG POINTS

Retains a scheme which has evolved over many years since World War II; is simple and relatively effortless thus matching the limited Departmental and volunteer effort apparently available to the service at the present time.

WEAKNESSES

Does not satisfy the perceived demands of change arising from the amateur community, in particular, does not offer the range of entry points seen by many to be lacking at present. May lead to a contracting amateur environment in the long term with contracting numbers of licencees leading to contracting frequency allocations. Is vulnerable to criticism of ultra-conservatism and inactivity.

MORE ENTRY POINTS WITHIN EXISTING RANGE

This option, with more entry points within the existing range of Novice to Unrestricted, is essentially the preferred option of the *Proposal to Restructure Amateur Radio Licencing* paper. That is, theory examinations with two levels of difficulty, Morse examinations at two speeds (plus no Morse), combined with a single regulation examination. This combination mixes and matches to yield, in ascending order, the following licence grades:

VHF Novice
Novice
VHF Intermediate
Intermediate
Unrestricted

STRONG POINTS

The desire to make changes, yet retain Novice as the lowest level of theoretical knowledge and Unrestricted as the highest licence grade, are satisfied. This proposal, without introducing any further costly examinations, provides additional entry points and retains the obvious progression and hence incentive to upgrade. Also, a common frequency band is provided for all classes of licencees.

It has a minimum of transition problems being easily "grandfathered" for existing licencees and, at the worst, has only minor impact on examination syllabuses.

It promises stability for years to come, for should WARC 92 make major changes to Morse proficiency requirements, licence grades can be simply merged.

Finally, this option aligns itself well with the recently negotiated Japan/Australia reciprocal agreement.

WEAKNESSES

The obvious weakness is the provision of considerable VHF/UHF spectrum to "Novice" licencees who have only satisfied the basic level of theory, but in all fairness it must be observed this is not as much as that permitted by the Japan/Australia reciprocal agreement.

A secondary, but not insignificant consideration is the possible extension of the basic theory examination (Novice) to include FM and VHF/UHF propagation (beam antennas are used at HF and should already be included!).

ADD A LEVEL BELOW NOVICE USING TYPE APPROVED EQUIPMENT

This options adds to the current situation (option "no change" above) a "student" grade of licence below Novice, permitting voice operation on a portion of a the VHF/UHF band with low power output type approved FM transceivers.

STRONG POINTS

Satisfies a need perceived by some for a student licence grade. Type approved equipment controls frequency bands employed, modulation mode and output power and reduces the likelihood of interference through poor quality signals. Provides the newcomer with immediate access to amateur radio activities and hands-on operating experience, an ideal way to get started using FM voice on VHF/UHF repeater frequencies.

WEAKNESSES

The need for a lower grade than Novice is not supported by the Amateur Radio Service which believes training can be achieved through supervised use of clubs, etc stations. Also, type approval of equipment does not accord with current WIA policy or the experimental nature of amateur radio.

One extra costly examination (or more) is introduced into the system and the student licence tenure (fixed term or renewable?) would be debatable.

There isn't strong support for further operators (holding lower grade licences) on existing VHF repeaters, hence the most popular 144 MHz band is ruled out.

This proposal too closely parallels the UHF CB licence yet amateur radio and citizens band communications have widely differing objectives and very little in common.

EXTENSIVELY WIDEN THE SPAN OF LICENCES

This option proposes a scheme similar to that adopted by a number of other IARU member nations. A wide range of licences extending from well below the current Novice grade (see "student" grade above) to above and beyond Unrestricted, eg an "advanced" class. Associated with each grade is a series of frequency band segment allocations and authorised emission modes (not unlike the USA).

STRONG POINTS

The increased number of entry points would permit those interested in amateur radio to select their desired starting point and upgrade as the need or wish arises. Each licence grade would get a small slice of spectrum in a range of bands permitting their particular interests, be they DX, rag chewing, or contests/awards, to be satisfied yet provide additional spectrum and emission modes/power output for upgrading.

WEAKNESSES

The option has many weaknesses, firstly the licence grades below Novice and above Unrestricted do not accord with expressed amateur service wishes. Secondly, the "bitty" nature of allocating frequency band segments and emissions modes/power output to each licence class is difficult to police and would call for detailed regulations in contradiction to expressed Departmental and amateur views on deregulation.

Many licence grades would require many examination elements to establish the qualification levels. Examinations which, regardless of devolvement by DOTC, are costly to attempt and demanding of man-hours and time to conduct effectively. It has also been claimed the setting up of additional licence grades in the USA a number of years ago detracted from the expansion of amateur radio in that country for a considerable period.

REMOVE ALL THEORY EXAMINATIONS, TWO GRADES OF LICENCE

This option, based on the premise that amateur radio should be available to all, is constrained by current international agreements as to Morse code proficiency. Consequently, a VHF/UHF licence is proposed upon application, convertible to all amateur bands on completion of a basic Morse test. A regulations test may be applied.

STRONG POINTS

Simplicity and ease of administration are key qualities of this option. Coupling a basic Morse test, by say a fellow amateur, with an over-the-counter "Z questions" regular test, it may be possible to issue licences and call signs for life for a single application fee.

WEAKNESSES

The option does little to acknowledge the experimental nature and self-instruction rationale behind amateur radio. Instead it is essentially an authority to allocate a call sign and operate and differs little from CB.

Its principle detraction is its perceived lack of credibility in the international forum. No other nation would enter into a reciprocal licence agreement and the Australian amateur licence would lose all standing world-wide. The WIA would be unable to support this option for reason of its not having the characteristics of testing and certification of qualification vis-a-vis other IARU national licences.

REMOVE ALL EXAMINATIONS, ONE GRADE OF LICENCE

This option is an extension of the one above, deleting the basic Morse test to yield one amateur licence upon application providing access to all amateur frequency allocations and emission modes. A regulations test may be applied.

STRONG POINTS

Like the option above, this one would be even easier to administer by over-the-counter regulations testing, perhaps on the licence application fee.

WEAKNESSES

All the weaknesses of the option above apply here, compounded by non-compliance with ITU Radio Regulations on Morse code proficiency. In fact, the amateur licence would be reduced to an operating permit very like the current CB licence. Again, the WIA would be unable to support this option for it contravenes existing Institute policy.

Finally, it is not the wish of the Amateur Radio Service to reduce its stature to this unqualified level as demonstrated by the continued support for amateur radio vis-a-vis the citizens band service.

COMPARISON OF OPTIONS

The options presented above have ranged from the difficult, that is, more difficult than the existing licence structure to the most simple, obtainable over the counter for a basic test in radio regulations.

When the constraints imposed by the relatively small numbers of operators nation-wide (some 16 000), the Departmental effort available from licence fees to administer and regulate the service and the lack of general support for major upheaval from within the amateur movement are considered, the extreme options can be rejected. Nevertheless, there is a widespread desire for moderate changes to extend the availability of amateur radio to a wider potential audience. This suggests the "more entry points within existing range" option as best meeting the expressed needs of the amateur service, acknowledging that some adjustments may be necessary should WARC 92 significantly change the Morse proficiency requirements.

CONCLUSIONS

In the longer term, the future of Morse code proficiency qualifications will be determined at WARC 92, for the short term no change is proposed to test conditions.

Present WIA policy seeking amateur licence currency for more than one year at pre-rate reduced charges remains a worthwhile negotiating objective.

The WIA must soon decide upon a first negotiating position in regard to frequency allocations and attitudes for WARC 92. This position must be advised to IARU members.

There may be anti-discrimination grounds to seek redress of the imbalance created for Novices by the Japan/Australia reciprocal licence agreement.

A regulatory balance is slowly being achieved under the Radiocommunications Act. This can be aided by formation of Divisional WIA/DOTC joint committees to support self-regulation goals.

The preferred option for the Amateur Radio Service structure is one with no licence grade lower than the existing Novice theory level, no grade more difficult than the existing Unrestricted and having an increased number of entry points.

RECOMMENDATIONS

It is recommended:

a. No change be made to the amateur Morse code proficiency requirements until after WARC 92 when the outcome of that Conference may be implemented.

b. The WIA should press actively for an amateur licence currency in excess of one year with commensurately reduced fees.

c. The WIA agree its position for frequency allocations for WARC 92 at the 1988 Federal Convention and convey that position to IARU members at the Region 3 Conference at Seoul in 1988.

d. The Japan/Australia reciprocal licence agreement be examined for discrimination against Australian novices and, if confirmed, redress be sought.

e. The formation of WIA/DOTC joint committees be encouraged to facilitate communications with the Department and support self-regulation of amateur radio.

f. The option for more entry points within the existing Novice to Unrestricted licence range be represented to DOTC as the WIA's preferred option.

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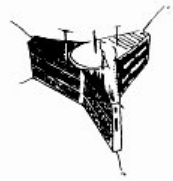


AMSAT Australia

SATELLITE ACTIVITY FOR THE MONTHS OF AUGUST/ SEPTEMBER

1 LAUNCHES

The following launching announcements have been received:

INTL NO 1987	SATELLITE	DATE	NATION	PERIOD min	APG km	PRG km	INC deg
070A	ETS 5	Aug 27	Japan	633.0	35901	199	27.9
071A	Cosmos 1873	Aug 28	USSR	88.8	274	186	64.8
072A	Cosmos 1874	Sep 03	USSR	89.6	333	208	73.0
073A	Ekran 16	Sep 04	USSR	23h43m	35539		0.4
074A	Cosmos 1875	Sep 07	USSR	114.0	1437	1401	82.6
074B	Cosmos 1876	Sep 07	USSR	114.0	1437	1401	82.6
074C	Cosmos 1877	Sep 07	USSR	114.0	1437	1401	82.6
074D	Cosmos 1878	Sep 07	USSR	114.0	1437	1401	82.6
074E	Cosmos 1879	Sep 07	USSR	114.0	1437	1401	82.6
074F	Cosmos 1880	Sep 07	USSR	114.0	1437	1401	82.6
075A	PRC 21	Sep 09	China	89.6	308	204	63.0
076A	Cosmos 1881	Sep 11	USSR	89.5	278	227	64.8
077A	Cosmos 1882	Sep 15	USSR	88.6	253	196	82.3
078A	Aussat K3	Sep 16	ESA/Aust	1429.6	35814	35506	0.2
078B	ECS 4	Sep 16	ESA	1438.0	35989	35690	0.2
079A	Cosmos 1883	Sep 16	USSR	11h15m	19133		64.9
079B	Cosmos 1884	Sep 16	USSR	11h15m	19133		64.9
079C	Cosmos 1885	Sep 16	USSR	11h15m	19133		64.9
080A	Oscar 27	Sep 16	USA	107.3	1183	1018	90.3
080B	Oscar 29	Sep 16	USA	107.3	1183	1017	90.3
081A	Cosmos 1886	Sep 17	USSR	89.8	384	178	67.2
082A	Progress 32	Sep 23	USSR	88.8	267	193	51.6

2 RETURNS

During the period 81 objects decayed including the following satellites:

1986-102A	Cosmos 1810	Sep 11
1987-066A	Progress 31	Sep 23
1987-069A	Cosmos 1872	Aug 30
1987-071A	Cosmos 1873	Sep 14
1987-072A	Cosmos 1874	Sep 17

—Contributed by Bob Arnold VK3ZBB

ar

Novice Notes

SOME PRACTICAL TIPS OF VFO CONSTRUCTION

Drew Diamond VK3XU
'Nar-Meian', Gatters Road, Wonga Park, Vic. 3115

Just about everybody who has attempted a project involving a variable frequency oscillator (VFO) will probably know of the frustrations that can occur in trying to get the thing to perform properly and supply a satisfactory stable output frequency. To the novice, VFO construction may appear to be more of a 'black art' than a science. Traditional radio literature carries a wealth of circuits for just about every amateur application, but the practical aspects are generally given only a few paragraphs. What follows is by no means a full treatment of VFO construction, but is based on actual experience and will, I hope, be some useful tips upon this most interesting subject.

A VFO has many important requirements — good short and long-term frequency stability, constancy of output level, low noise, immunity from mechanically induced frequency changes, spectral purity and preferably, linearity of tuning. To satisfy all these is a lot to ask of any device!

There is a puzzling tendency these days for some builders, especially manufacturers, to make a VFO using sloppy techniques, and then to tack on a phase-locked loop (PLL) to stabilise the thing, so adding unnecessary complexity (and noise), and reducing the overall reliability of the device. If the amateur is prepared to put a little thought, effort and material into the job by following some pretty well established guidelines; the result will be a quality VFO without the need for the PLL panacea.

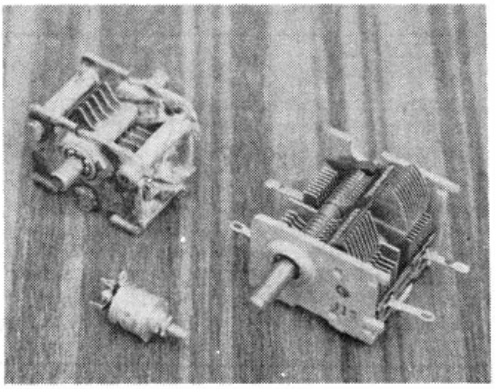
Our first, and most significant enemy is heat, or changes in heat level really. As the components in the frequency determining part of the VFO (oscillator tank) heat up or cool down, their values change, and the frequency will change as a consequence. Obviously, the oscillator circuit itself should be housed in its own enclosure to buffer it from the effects of air draughts, and to slow down any sudden changes in surrounding temperature.

A good plan is to accommodate the entire VFO in a metal box with a tight fitting lid. A die-cast box is ideal, but very good results have been obtained using boxes made from double-sided printed circuit board cut to size and soldered together. The box should, if possible, be thermally insulated from the main equipment chassis. One way of doing this is to attach the box with screws passed through rubber grommets set into the chassis, so providing a useful degree of thermal isolation.

All sources of heat should be distanced from the VFO as far as practicable. These include power resistors, power transformers, power transistors (in fact power anything!), valves, etc. Solid state oscillators therefore offer a stability advantage over one using a valve. Consideration should be given to making the VFO a 'stand-alone' unit if this suits operational requirements. Furthermore, if arrangements can be made for the VFO to run continuously, 24 hours a day, then a considerable improvement in stability will be achieved.

Feedback problems can, and probably will arise if an unshielded VFO runs on the final output frequency of a high power transmitter. So building the VFO into a tight RF proof box not only offers improved frequency stability, but also system stability.

The voltage supply which powers the oscillator must be very well regulated, as small variations in supply voltage can produce changes in oscillator frequency. Even if the main equipment rail (usually 12 volts nominal) is regulated, it is a good plan to drop the voltage to the oscillator and zener it at about 6.8 volts through a 470 ohm resistor from the 12 volt rail. If the loading on the VFO varies, for instance where a keyed stage closely follows the oscillator, then at least one buffer amplifier should be interposed between these stages.



Photograph 1.

CAPACITORS

Variable capacitors of any kind are becoming difficult to obtain, let alone the most desirable type for VFOs — the double bearing, through-shaft, ceramic insulated, split segmented one shown on the left in photograph 1. Note also that a separate spring contact makes the electrical connection to the rotor. These are now highly prized and very difficult to find. I can only suggest that if you see any of these on sale anywhere; buy them, even if you do not have a project in hand at the time. The more commonly available kind is shown to the right — an ordinary BC type made for consumer products. These usually have only one proper ball bearing, aluminium plates (less desirable then silver-plated brass), and ordinary bakelite insulation. Even these are now hard to obtain. I have used this type in many VFO projects, and they have proved satisfactory. * If a choice exists, or when buying, make sure that the shaft rotates smoothly and effortlessly, with no detectable play in the bearing/s. Avoid the kind of capacitor which has only one bearing, as these are notoriously unsuited to VFO applications because of the play which soon develops in this one bearing. Trimming capacitors should ideally have air dielectric. The round Philips 25 pF 'beehive' units are still available from several sources.

* The author was given a number of these, and they are available free to interested experimenters.

Varactor diodes offer an alternative, although their Q cannot be as high as is obtainable with a good mechanical capacitor. Some purists will not use a varactor diode for high stability applications, although, in my own experience, it is possible to build an entirely satisfactory VFO with a varactor as the tuning element. Use of high-stability close tolerance resistors, a good quality potentiometer and a very well regulated and bypassed supply is mandatory when using a varactor however. Reference four has details of a well researched varactor tuned VFO.

Overseas publications often specify silver mica capacitors for the C component of the oscillator tank, although in this country they have become very difficult to buy in small quantities. These capacitors are usually very stable with temperature, although I am not sure myself that their higher cost is justified. A good and easily obtainable substitute is the styroseal or polystyrene capacitors, which generally exhibit a very slight negative temperature coefficient. These are available from about 30 pF to 0.01 uF. For small values of C, less than about 270 pF, NPO ceramic types are generally satisfactory, although some experimenters have reported stability problems with these. NPO capacitors are often marked with a black spot.

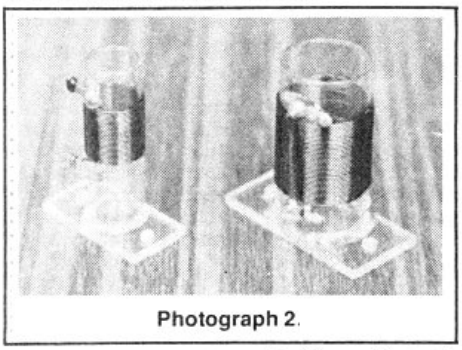
If you find that your nearly finished VFO tends to move lower in frequency as it warms up. it may be possible to substitute some of the tank C with capacitance with a negative coefficient. Only a small amount is generally required. There are no rigid rules applicable to finding the amount required. Start by substituting say 10 pF of tank C with 10 pF worth of N750 C, and observe the results. With cut and try, it should be possible to effect a significant improvement in stability. N750s are often marked with a violet spot. Remember to allow anything up to an hour for your components to stabilise after soldering.

INDUCTORS

The turns of the coil must be held rigid, and the coil solidly mounted to prevent any kind of movement, so some sort of former for the coil will be required. Any material which readily distorts or changes shape with heat must therefore be avoided. PVC, polystyrene and similar materials are not suitable (bang goes the idea of using PVC pipe!). The best material for the amateur is probably Teflon or PTFE tube. This substance is a delight to work, as it cuts and machines beautifully, and is very stable indeed. Electrical insulation wholesalers usually stock Teflon tube

and rod in various sizes. It is rather expensive, but worth the cost. A ceramic former, perhaps salvaged from some military equipment is a good choice also. Glass is a reasonable choice if Teflon or ceramic formers cannot be obtained.

As an example of home-brew, Photograph 2 shows two solenoid coils wound upon glass phials of the kind used by chemists. Two solder tags have been glued with epoxy cement to the former to provide tie points for the winding, and a perspex mounting base attached.



Photograph 2.

Some circuits specify a coil with an adjustable slug of powdered iron to provide a means of varying the inductance of the coil by a small degree. The permeability of any slug will most likely be greatly influences by temperature. Therefore, the slug of such a coil must never be relied upon to provide a significant amount of the total inductance, ie the slug should just influence L by being only slightly engaged into the coil winding.

Generally speaking, toroidal cores should not be used for VFO tank inductors, due to their susceptibility to temperature changes. Curiously enough, one of the most stable VFOs I ever made used a coil wound upon an Amidon T68-2 core (Ref 5), so it would appear that this core is very stable. However, I cannot vouch for any other core type. The great advantage with toroidal cores is their closed magnetic field, so they do not radiate unduly, nor are they as susceptible to external fields as an ordinary coil would be.

For maximum frequency stability, the tuned circuit Q, and hence the inductor Q must be as high as possible. Some empirically derived rules of thumb may be applied to the achievement of a high coil Q:

- Q increases with coil diameter and wire gauge.
- Q increases with coil length, but not significantly beyond the point where the length is 1.5 times the diameter.
- Maximum Q is obtained with a spacing between adjacent turns which is about the same as the wire diameter (selection of the nearest standard wire gauge is satisfactory for practical purposes).
- Metal objects, including the coil can if fitted, should be distanced from the coil by at least one coil diameter.
- The use of 'litz' wire (if available) can only be justified between about 0.5 and 3 MHz.
- Do not leave residual deposits of perspiration or oils on the enamelled wire or the coil former.
- For high L stability, the wire should be wound onto the former under tension.

OTHER CONSIDERATIONS

In addition to using the best variable capacitor available to you, some sort of dial arrangement must be devised. One trap for the unwary is to directly connect the capacitor shaft to a reduction drive. If the alignment between drive and capacitor is poor, the drive will be stressed and become 'back-lashy' with use. In addition, the frequency variation with rotation may not be smooth, but could be rather 'gritty' (frequency scintillation). This is due to the alternative, but inconsistent alternative ground path for the capacitor rotor connection through the balls or gears of the drive. The solution of course is to interpose an insulated flexible coupler between drive and capacitor shaft. As these too have become hard to get, a reasonable substitute can be made at home. A short length of 0.25" insulated rod (eg No 3 knitting needle) may be cut in four places as illustrated in Figure 1.

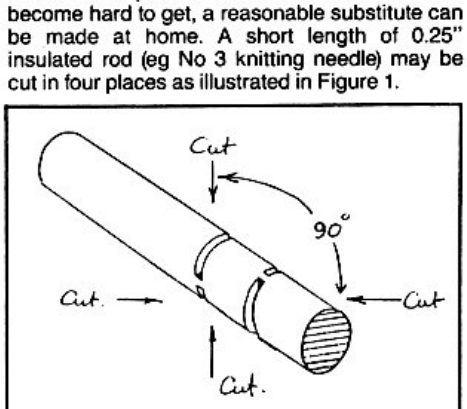


Figure 1.

This is connected via an ordinary solid brass coupler to the capacitor shaft, and would provide adequate coupling flexibility if the drive and capacitor are reasonably well aligned.

There is still some debate going on (Ref 6) as to the advisability of accommodating the VFO tank components on printed wiring board. Some experimenters favour other methods, including good old tag strip. The insulating material in the PWB forms the dielectric of small but significant capacitances, and these may be temperature sensitive. My own experiences have indicated that these effects will not be a problem if fibreglass board is used, and double-sided material is avoided. In addition, those little ceramic stand offs are ideal for use as component tags if available (Photograph 3).

Whatever the construction method, all the components in the oscillator circuit must be mounted so that they cannot move. Any necessary wire connections, like that between the PWB and the variable capacitor should be of a heavy gauge, No 18 at least, and kept as short as practicable. Clearly, any long lengths of wire which can flop about will vary the parasitic C and L around the circuit, and affect the frequency.

CHECKING VFO STABILITY

It would be difficult to put an actual figure on any VFO stability requirement, so the particular

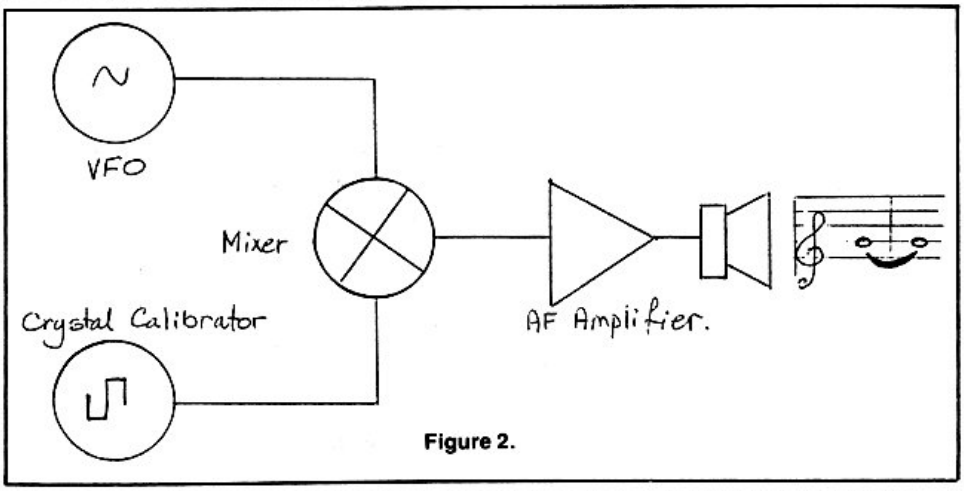
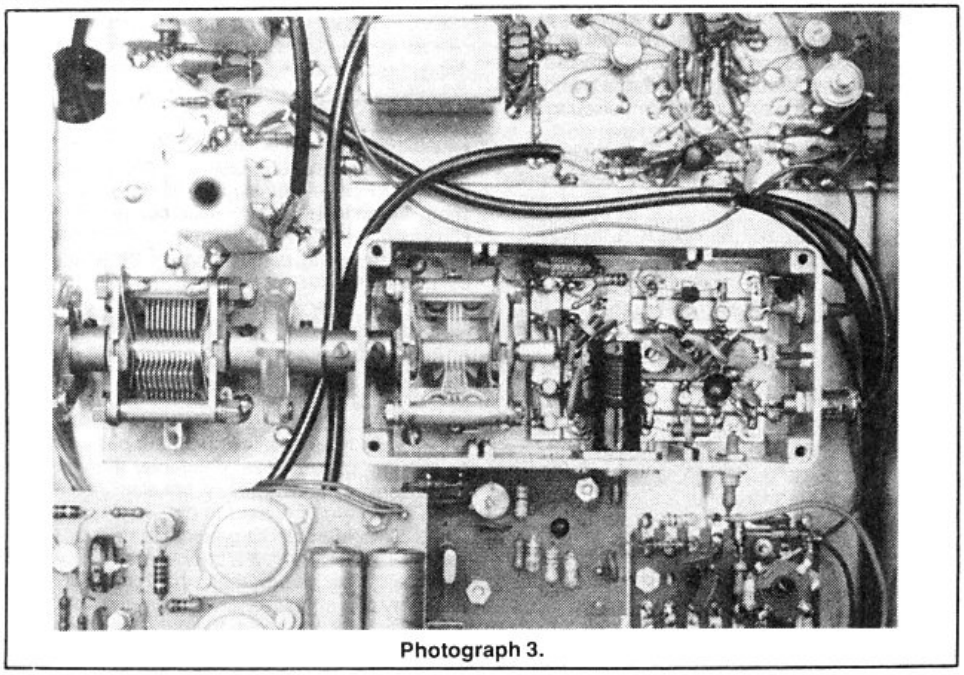
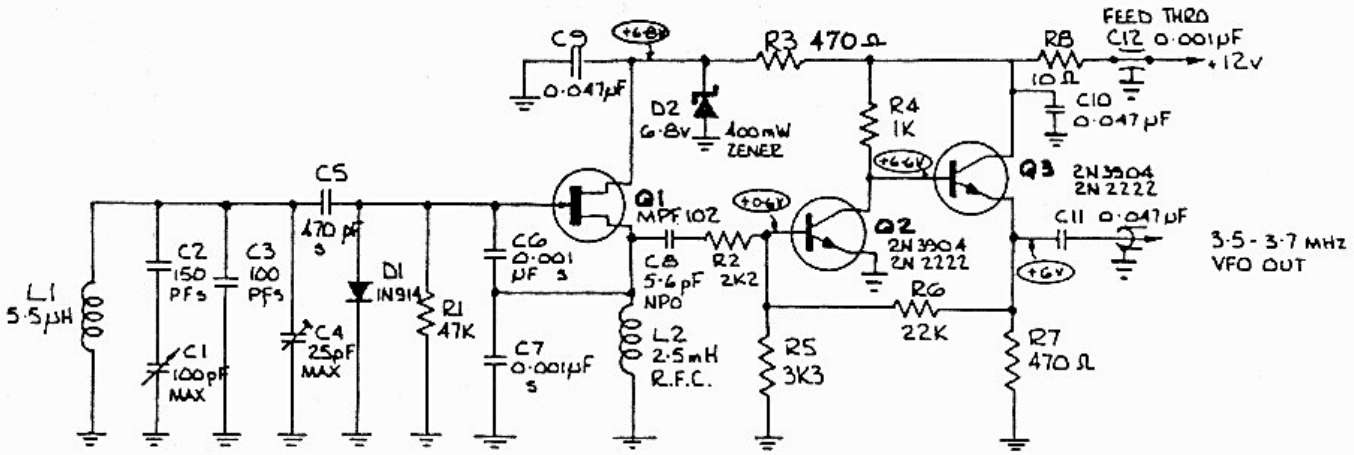


Figure 2.



Photograph 3.



Note:
L1: 32 turns No 22 B & S on Amidon T68-2 Toroidal Core.

All capacitors > 16V.
S = Styroseal (Poly).
Other Disc Ceramic
All Resistors ¼W 5 percent.

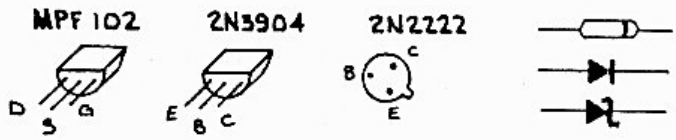


Figure 3.

application must be considered. A figure of five parts per million after warm-up is however, not unreasonable to aim for, and with care, it may even be possible to approach the stability of a crystal oscillator.

There are several methods available to us for checking frequency stability; if not absolute frequency. If you have access to a frequency counter, it is just a matter of observing the frequency trend of the display, and deciding if the stability is adequate for the intended application.

If your receiver covers the VFO frequency; simply check this against the receiver calibrator (on AM).

The 1940s frequency meter BC221 still represents a useful tool even today. The VFO signal is applied to the meter input, and the frequency manually measured off. By listening to the beat note the user gets an immediate idea of the frequency stability of the VFO.

The schematic in Figure 2 shows another method which makes use of a four-diode mixer, a crystal calibrator and an audio amplifier.

The calibrator is set to deliver a harmonic upon the expected VFO frequency. When the VFO is close to the harmonic frequency, say 1 kHz different, a 1 kHz tone will be heard (we have, in fact, a DC receiver). By listening to the constancy of the tone, we soon obtain a 'feel' for the frequency stability With a little careful observation, it will also be possible to do some absolute frequency measurements with this technique. For example; if our VFO is expected to tune from 2.9 to 3.4 MHz, the calibrator would first be set to deliver 2, then 4 MHz pips. Only weak beats should be heard when the VFO is tuned through its range. However, with the calibrator set to 1 MHz pips; a very strong signal will be heard when the VFO is swept across the third harmonic at 3 MHz. This establishes the 3 MHz point. With the calibrator now set to 100 kHz; the 2.9, 3.1 etc points can be found, and the actual tuning range confirmed.

TYPICAL CIRCUIT

The Colpitts circuit shown in Figure 3 is typically the sort of VFO to be found in many applications today, and is a deservedly popular arrangement.

In the example shown in Figure 3, the frequency range is nominally 3.5 to 3.7 MHz, and formed part of a DSB/CW transmitter project (Ref 5). The components in the oscillator tank may be scaled up or down to suit the frequency required. This circuit has been used successfully to cover specific frequency ranges between 1.8 and 29 MHz.

Some examples are given in Figure 4 for tank, values to cover other popular frequencies. Other ranges can be found by calculating the values of capacitance and inductance to yield the reactances shown. The nearest preferred component to the calculated value will normally suffice.

References and Further Reading

1 Solid State Design — ARRL
2 Radio Amateurs Handbook — ARRL
3 Radio Communication Handbook — RSGB
4 Building Blocks Revisited — Hepburn VK3AFQ, AR, August 1987
5 DSB/CW Transmitter — Diamond VK3XU, AR, March 1985
6 A Stable VFO on PCB — Keyser G3ROO, CW Mag, May 1986
7 Practical RF Design Manual — DeMaw, ISBN 0-13-693754-3
8 Radiotron Designers Handbook — Langford-Smith

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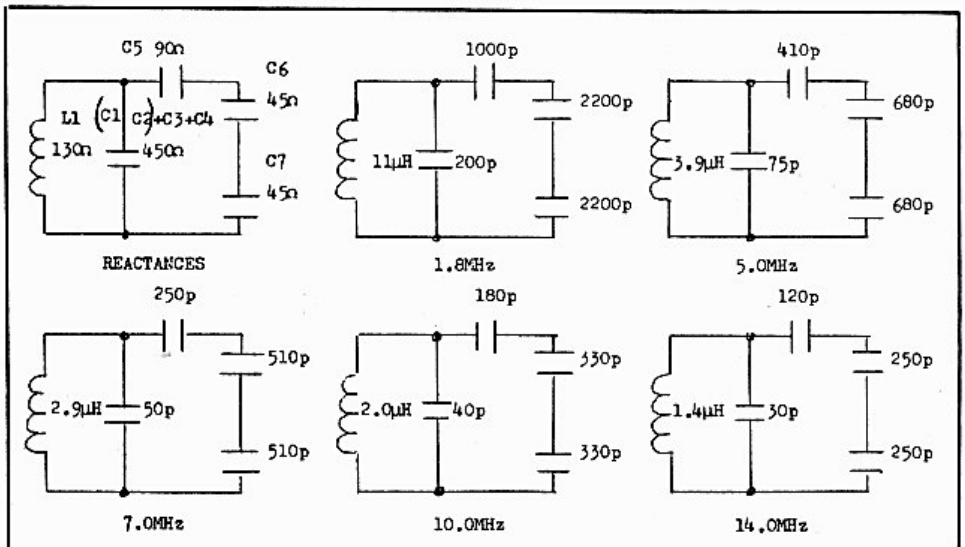

Figure 4.

VHF UHF — an expanding world

Eric Jamieson VK5LP
8 West Terrace, Meningie, SA. 5264

All times are Universal Co-ordinated Time and indicated as UTC

AMATEUR BANDS BEACONS

FREQUENCY	CALL SIGN	LOCATION
*50.005	H44HIR	*Honiara* [1]
50.010	JA2IGY	*Mie*
*50.022	ZS6PW	*Pretoria*
50.075	VS6SIX	*Hong Kong*
50.090	KH6EQI	*Honolulu*
52.013	P29BPL	*Loloata Island*
52.100	ZK2SIX	*Niue*
52.200	VK8VF	*Darwin*
52.250	ZL2VHM	*Manawatu*
52.310	ZL3MHF	*Hornby*
*52.320	VK6RTT	*Wickham*
52.325	VK2RHV	*Newcastle*
*52.330	VK3RGG	*Geelong*
52.345	VK4ABP	*Longreach*
52.350	VK6RTU	*Kalgoorlie*
52.370	VK7RST	*Hobart*
*52.418	VK0MA	*Mawson*
*52.420	VK2RSY	*Sydney*
52.425	VK2RGB	*Gunnedah*
*52.440	VK4RTL	*Townsville*
*52.445	VK4RIK	*Cairns*
*52.450	VK5VF	*Mount Lofty*
*52.460	VK6RPH	*Perth*
*52.465	VK6RTW	*Albany*
52.470	VK7RNT	*Launceston*
*52.485	VK8RAS	*Alice Springs*
*144.022	VK6RBS	*Busselton*
144.400	VK4RTT	*Mount Mowbullan*
*144.410	VK1RCC	*Canberra*
*144.420	VK2RSY	*Sydney*
144.430	VK3RTG	*Glen Waverley*
*144.445	VK4RIK	*Cairns*
*144.445	VK4RTL	*Townsville*
*144.465	VK6RTW	*Albany*
144.470	VK7RMC	*Launceston*
144.480	VK8VF	*Darwin*
*144.485	VK8RAS	*Alice Springs*
*144.550	VK5RSE	*Mount Gambier*
144.565	VK6RPB	*Port Hedland*
*144.600	VK6RTT	*Wickham*
*144.800	VK5VF	*Mount Lofty*
*144.950	VK2RCW	*Sydney*
*144.950	VK3RCW	*Melbourne*
*145.000	VK6RPH	*Perth*
*432.066	VK6RBS	*Busselton*
*432.160	VK6RPR	*Nedlands*
*432.410	VK1RBC	*Canberra*
*432.410	VK6RTT	*Wickham*
*432.420	VK2RSY	*Sydney*
432.440	VK4RBB	*Brisbane*
*432.445	VK4RIK	*Cairns*
*432.445	VK4RTL	*Townsville*
432.450	VK3RAI	*MacLeod*
432.535	VK3RMB	*Mount Buninyong*
432.540	VK4RAR	*Rockhampton*
*1296.198	VK6RBS	*Busselton*
*1296.420	VK2RSY	*Sydney*
*1296.445	VK4RIK	*Cairns*
*1296.480	VK6RPR	*Nedlands*
10300.000	VK6RVF	*Roleystone*
*10445.000	VK4RIK	*Cairns*

* Those beacons preceded by an asterisk have been confirmed as operational, either by the custodian or another interested person. A helpful telephone conversation with Bob VK6KRC, confirmed the status of a number of the VK6 beacons and he is trying to establish the position with the remainder of his State.

The VK1 beacons have been confirmed by Dick Elliott VK1ZAH, the VK1 FTAC representative. He said the 51.410 MHz beacon was under development, but had never been tested on air. The two VK1RBC UHF beacons share one identifier controller and use FSK for identification.

Dick said there is a weak sub-harmonic from the 1296 beacon on 432.1367 MHz which, although not radiated by the 1296 antenna, is discernible over much of north-west Canberra. It is currently considered a QRP beacon because the signal has been so hard to effectively remove and probably requires a complete re-build of the system. The 144 MHz beacon is on Mount Majura while the others are at Aranda, a Canberra suburb. Eventually it is hoped to have them all on Mount Majura for an improved coverage.

1 The H44HIR beacon has been relisted in response to a message from Phillip FK1TS, who said he has heard the beacon operating and sending a message "QSX 28R885" (this being the 10-metre liaison frequency for six metre operators). This beacon used to be a regular on the band a few years ago during a better part of the solar cycle.

Phillip has recently returned from a visit to Townsville, where he met other six-metre operators, VK4FXZ, VK4KAA, and confirms the VK4RTL beacon is operating well.

On returning to Noumea, he found many JA signals on 50.110 MHz, October 26. Although only running three watts to a wire antenna, he managed to work three in JA2 and one JA9. More could have been worked except for an emergency arising at his work place so he had to reluctantly leave the band.

Phillip now has 25 watts on two-metres via an IC290H; also dual band mobile antenna and duplexer so will be able to listen on 144.100 MHz, during six metre openings.

CLIMBING MOUNT MINTO

Mount Minto is in the Admiralty Range which lies across the Transarctic Mountains, near the northern tip of the western coast of the Ross Sea. It is 4163 metres ASL and has never been ascended although numerous attempts have been made during the past 20 years, the most recent being an Austrian expedition in 1985/86, and again in 1986/87. Most attempts have been beaten by the weather.

A letter from Don Richards VK2BXM, (which arrived just too late for inclusion in last month's issue), says plans are advanced for another voyage to the south in the *Dick Smith Explorer*, to try to scale Mount Minto. The team will leave in December and Don will be the ship's master and radio operator. It is hoped to land a shore party at Cape Hallett or Cape Adare, about 70 kilometres from Mount Minto. A helicopter can be used to get the party ashore if the shore cannot be approached. The ship will then put to sea where it will continue with a marine studies project. The shore party will be faced by a long slugging trip across the broken and crevassed ice cap before starting the actual climb.

Don VK2BXM, says he will be taking mainly HF equipment and will not be leaving the ship. He hopes to obtain the loan of a suitable two metre transceiver with SSB and FM and would be interested in trying auroral scatter contacts. He would like to take six metres, but the size of a suitable beam is hard to accommodate amongst all the other equipment on board, and it will be difficult enough with a two metre beam! He is not planning to use a VK0 call sign, but his own plus /MM.

The distance is about 2400 nautical miles from Sydney on a course of 171 degrees T, for the Ross Sea, where he and the others in the team should arrive about three weeks later. If Australia was to experience another large auroral period like last February, then a contact on two metres is a distinct possibility. Although not stated in the letter, one would think Don would at least start any calls on the calling frequency of 144.100 MHz. The letter says I am to receive further information.

FROM SOUTH AFRICA

Hal Lund ZS6WB, has sent another copy of *VHF News* and special prominence is given to the Heard Island DXpedition mentioned in these columns last month.

Also mentioned was the first QSO of the Six Metre TEP Tests on 2/10 when Dave A22KZ, in Maun and Costas SZ2DH, in Athens, Greece, for 15 minutes on 50.110 MHz at signal levels around 5x4. At 1527 UTC, Dave reported hearing the 9H1SIX beacon in Malta, and by calling on both 28.885 and 50.110, eventually the two-way contact resulted. The beacon continued to be heard at A22KZ until after 1900 UTC. The beacon appeared again on 4/10, but no one could be raised in the European area.

JAPANESE JOTTINGS

My good friend, Yoshi JA1VOK, has sent me October and November copies of the independent DX magazine, *Five Nine* which also carries the heading *Message for DX Lovers!* It is written in Japanese with English for some of the tables and charts, but Yoshi has added some English translations for me.

The first page of information is headed *World VHF News JA1VOK*, and carries a greeting for the starting of a VHF column in what has probably been an HF magazine, as this page is actually number 26! The top 100 50 MHz DX standings are taken from the *QST* columns by Bill Tynan W3XO, which shows JA4MBM as heading the list with 79 countries confirmed and 81 heard. VE1YX is next with 77/79. Yoshi, together with JH1XWA, visited Bill Tynan in April 1987, and they are shown in a picture together in Bill's shack.

The CT0WW beacon on 50.030 MHz is listed as having 40 watts output, whilst the new South African beacon on 50.0225 is given prominence. European beacons are SZ2DH on 50.015; GB3SIX 50.020; CT0WW 50.030; ZB2VHF 50.035; OX3VHF 50.045; GB3NHQ 50.050 and GB3RMK on 50.060 MHz.

Chinese stations, BY4RB and BY4RN, around August 20 to 24, were working JAs; but on 21/6 at 0530 N5CW heard JE2KCP over a distance of about 9000 kilometres. (This may have been some early F2 assisted by Es. The distance seems rather far for multi-hop Es alone).

It is also worthy of note that G3COJ worked 43 stations in the USA from 10/6 to 21/7. It will be interesting to see how long it takes to achieve a G to JA contact on six metres and for another VK to G contact to eventuate.

This spread of information into the pages of another magazine must surely be of benefit to those operating on VHF; we hope the work of JA1VOK is rewarded.

TWO METRES

Mark VK5ZMK, at Gepps Cross, Adelaide, found the two metre band to be in good condition around 1045 UTC on 27/10, when he worked David VK3AUU at 5/3 and received 5/4 and Les VK3ZBJ, 5/2 and 5/6.

Although the VK5LP establishment is still not operational after the big move, I would think the southern weather patterns would have to be conducive to some good openings on the band, perhaps even across to Albany and Esperence.

David VK3AUU, has sent some news of his exploits on two metres. During the special moon-bounce weekend of October 17 and 18, he again worked W5UN, this being the fifth time using 120 watts output to a single 19 element Yagi. Just before moon-set his signal was peaking at 20 dB above the noise in 50 Hz bandwidth. David also copied N5BLZ, WA1JXN/7, OZ1EME, DL8DAT, EA1LU and SM5FRH.

David said VK3AMZ worked W5UN and N5BLZ, and heard a few more than he did, as he has a pair of 15 element DL6WU antennas.

David also mentioned his contact with Mark VK5ZMK, and that the Adelaide beacon was good again the following night (28/10) but no QSOs resulted.

Some measurements he has done on sun noise with the sun setting at an elevation of +3 degrees, indicates a handy +5 dB of signal should be available due to ground reflection when the moon is rising or setting. This confirms observations at K2US.

EME REPORT

Doug VK3UM, spoke of some excellent conditions for 3/10, but the big EME weekend of October 17 and 18, was something of a disaster due to a large solar flare on the Friday night before resulting in a virtual wipe out of many signals. Signals could be there for two minutes then disappear for 20 minutes to half an hour, due to serious libration fading (although it appeared not to have been so bothersome in New Zealand).

On Saturday 17/10, for the first five degrees after moon-rise there were big echoes. Doug worked about 12 stations altogether, four Europeans and about eight in W-land. Some contacts were good, others a disaster! But he worked all he could hear including W3IWI on 70 cm, but, due to his signal level concluded he must be having some problems. ZL3AAD also worked W3IWI.

I hope I have this part of the message correct, but Doug advised that John ZL2AQE, had established a world record on EME of 2304 MHz to W3IWI. John was using five watts into a 12 foot dish. Good work!

Also reported was a station in the UK which would be coming on in November with a 64 foot dish. If everything works out well that should provide a hefty signal.

Doug VK3UM and Chris VK5MC, worked one another on 70 cm EME with M reports!

ALICE SPRINGS

On Monday, 2/11, Peter VK8ZLZ, during the late afternoon has the pleasure of getting amongst some JAs on six metres whilst mobile, running about three watts to a whip antenna. He worked several stations, but one signal stood out, JA3EGE, with whom reports were exchanged at 5x9 both ways! Mike VK8ZMA, worked many JAs as well, all on 52 MHz. In addition, Mike worked a VS6 in Hong Kong, but there are no details of the call sign.

In my telephone call to Peter he said he had just moved to another house which would place him about one-and-a-half kilometres from VK8ZMA, but a little to one side of a direct line, so was hoping the higher power Mike runs would not keep him off the band too much. Peter will be quickly getting on with the job of getting some antennas up, but this first of all requires a tower to be erected.

Peter also remarked that the Alice Springs beacons would be shifted soon to a new location south of the Alice where they should have a good take-off to VK5; he even suggests we may hear the two metre beacon before we can hear stations in the Alice!

50 MHz STANDINGS

The November issue of *QST* contains the latest list of 50 MHz standings by Bill Tynan W3XO. This has an update of information mentioned earlier in the Japanese magazine. VE1YX heads the list with 81 countries confirmed and 82 claimed; next is JA4MBM with 79/81 and K8WKZ with 73/76.

Looking down the list I see Graham VK8GB, still heads those from Australia with 42/42. Next are VK2BA and VK4ZJB both with 30/30. VK2DDG is given prominence as he features twice, once with 28/29 and then further down with 25/26. I presume the last entry was not removed after the update. I note there are a number of VK stations who have their listings in *QST* but don't bother to include them in my listing in AR!

Bill Tynan's *World Above 50 MHz* reports on a flurry of activity in the US in the microwave regions which is interesting as this area has long been the province of the European stations.

Bill also says there has been little long-distance propagation to report after the large degree of activity during their summer months.

And, whilst talking of reduced activity, I see by the listing for September in the Japanese CQ ham radio magazine (courtesy Graham VK6RO), that their Es season through June and July really did not produce anything of outstanding interest. Many contacts were made to Korea and Hong Kong, plus some to China and Guam, but little else. No contacts were reported having been made with Australia.

CLOSURE

There is not much else to report so there seems no need to prattle on! Hopefully I will have the antennas erected soon and be able to give some first-hand information on band conditions. During the heatwave recently, I took out the IC502 and listened on six metres under the power lines which pass along the front of the house and was pleased to note there was only a very low level of power leak, and what there was could be easily eliminated by the noise blanker, so that looks like one plus already noted.

May I take the opportunity of wishing everyone a happy and prosperous New Year and plenty of DX as we climb up from the trough of the solar cycle.

Thought for the month: "A woman described her father as a road-sweeper. She commented that some people branded his work as lowly, but she rated the person who picked up the rubbish far higher than the one who dropped it!" and "Youth, the more it is wasted the sooner it wears."

73, The Voice by the Lake.

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Book Review

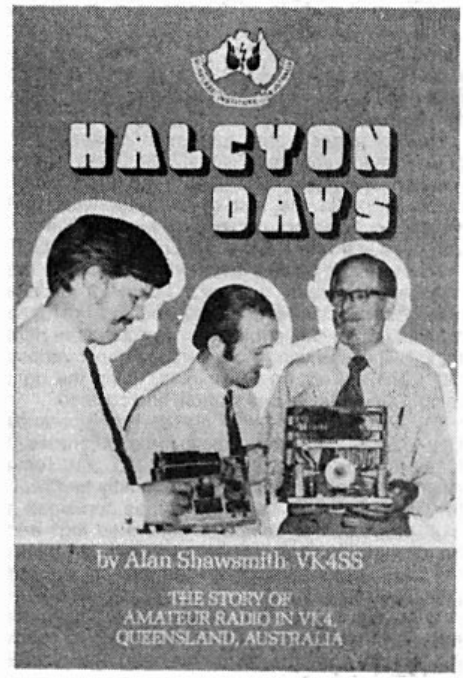
HALCYON DAYS

The Story of Amateur Radio in VK4, Queensland, Australia

by Alan Shawsmith VK4SS
(Official Historian, Queensland Division, WIA)

Published by Boolarong Publications

Bill Rice AX3ABP
54 Maidstone Street, Altona, Vic. 3018



The long awaited history of amateur radio in Queensland has made it into publication. VK4SS deserves the heartiest congratulations on the tremendous effort he has obviously put into this publication, which represents the culmination of years of historical research.

The book has 177 pages, and is divided into 17 chapters, with headings such as "Pathfinders", "QSLing", "Contests and Awards", but by far the largest is entitled "Profiles", and contains 49 pages of Alan's inimitable thumbnail sketches of notable Queensland amateurs, many of whom have now passed on to the ranks of the Silent Keys.

Alan chose the title "Halcyon Days" as best representative of amateur radio during the period between the two World Wars, and this would be true of most of the civilised world. The technology of world-wide communication evolved during this period, with amateurs providing more than their share of innovative effort, but from 1945 onward commercial exploitation of the spectrum began to snowball, alternatives to home-brewed equipment started to appear, and the world was never the same again! Perhaps we may hope that plans for a book on amateur radio post WWII are already developing in Alan's fertile mind!

If one could make any criticism of such a monument to dedicated effort, and I do so with some trepidation, it is that the book is about 99 percent devoted to Queensland, and gives little attention to parallel evolution of the hobby (dare I so belittle it? Way of life, perhaps?) in other States and overseas. But I fully realise that a similar book about Australia as a whole could well be a long life's work. Perhaps Alan should instead be congratulated on having set specific boundaries to his undertaking, and remained so effectively within them.

One ability possessed by a book such as this is to bring home forcibly to the modern radio amateur how great is the debt he owes to the pioneers who made it all possible. It should be compulsory reading for all who value our unique, demanding, but deeply rewarding part-time occupation!

Our copy came (via the author) from the VK4 Division. If not already sold out, the price is $12 from the WIA Queensland Divisional Bookshop, GPO Box 638, Brisbane, Qld. 4001.

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Contests

Frank Beech VK7BC
FEDERAL CONTEST MANAGER
37 Nobelius Drive, Legana, Tas. 7251

CONTEST CALENDAR

JANUARY 1988

2 — 3 *73* magazine 10 Metre SSB Championship Contest
9 — 10 *73* magazine 15 and 20 Metre SSB Championship Contest
9 — 10 European YL-OM Contest
— 10 Ross Hull Memorial VHF/UHF Contest concludes (Rules November issue)
16 — 17 *73* magazine 160 Metre World SSB Championship Contest
16 — 17 Hungarian DX Contest
23 — 24 *73* magazine 40 and 80 Metre World SSB Championship Contest
29 — 31 CQ WW 160 metres CW Contest
30 — 31 French DX CW Contest
30 — 31 YL ISSB CW QSO Party

FEBRUARY 1988

13 — 14 Netherlands "PACC" Contest
13 — 15 YLRL YL-OM Phone Contest
20 — 21 ARRL DX CW Contest
26 — 28 CQ WW 160 Metre SSB Contest
27 — 28 REF French DX Phone Contest
27 — 28 YLRL YL-OM CW Contest

MARCH 1988

5 — 6 ARRL DX Phone Contest
12 — 13 QCWA Phone QSO Party
12 — 13 RSGB Commonwealth CW Contest
19 — 20 WIA John Moyle Memorial National Field Day Contest (Rules next month)
19 — 20 YL ISSB Phone QSO Party
26 — 27 CQ WW WPX SSB Contest

May I offer my belated greetings for Christmas and wish you and yours a healthy, happy and prosperous New Year.

The Ross Hull Memorial Contest should be still under-way and providing some interesting new contacts, please send in a log and we may build up the contest again.

The contest season is now in full-swing and, from the list of contests in this issue of AR, there is a contest to suit almost every active amateur who likes a good contest, but I sometimes feel for those who just like to rag-chew on 20 metres over the weekend.

Rules for the John Moyle Memorial Field Day will be published next month, together with the results of the 1987 Remembrance Day Contest. The John Moyle Field Day Contest will coincide with the NZART National Field Day and, with a small change to a rule, will make it easier to run and take part in.

Now is a good time to remind contesters to please read, and read again, the rules before entering a contest, and then read them again before filling in the rest of the paperwork that should accompany your entry. The term "in accordance with the rules and spirit of the contest" means exactly what it says with respect to the rules. In the case of "spirit of the contest" this is a good old fashioned and probably out of style meaning, but I like to think of it as "doing the right thing". Those of you who enter logs under various call signs are not, in my opinion, doing the right thing. One call sign, one station, one contest!

During the period following the Remembrance Day Contest, and the closing date of entries, I found that the earlier entries received "and some claimed some high scores" were mostly handwritten, whereas those very late entries contained a high proportion of computer generated logs and handwriting that was not easy to read. Me thinks the computer is finishing off the job that the ball point pen started!

With the higher HF bands attracting more attention these days it will be interesting to check the activity that the *73* single-band world SSB championships generate. Your scribe will be looking at the other end with the hopes of that elusive opening on 160 metres that will get me one more towards the DXCC on 160 (look out Jim).

Rules for the 73 World SSB Championship Contests are as follows:

73 MAGAZINE WORLD SSB CHAMPIONSHIP CONTESTS

A series of six single band contests organised by *73 magazine* will determine the single band SSB World Champion on each band, 10 through to 160 metres.

Second annual 10 metre test (48 hours) will be held from 0000 UTC, Saturday, to 2400 UTC Sunday, January 2-3.

Fourth annual 15 metre test (24 hours) will be held from 0000-2400 UTC, Saturday, January 9.

Fourth annual 20 metre test (24 hours) will be held from 0000-2400 UTC, Sunday, January 10.

Ninth annual 160 metre test (48 hours) will be held from 0000 UTC Saturday to 2400 UTC Sunday, January 16-17.

Seventh annual 40 metre test (24 hours) will be held from 0000-2400 UTC, Saturday, January 23.

Seventh annual 75 metre test (24 hours) will be held from 0000-2400 UTC, Sunday, January 24.

CLASSES: Both single and multi-operator, single transmitter. Stations may operate the full contest period regardless of their classification.
SPECIAL 10 METRE: Novice single operator, limited to 250 watts PEP. 28.300 to 28.500 MHz, can compete with each other.
EXCHANGE:RS report and state, province, or territory for the 48 US states and 13 Canadian areas. RS and country for DX stations, including Alaska and Hawaii. For 10 metre US Novice, RS and state, and consecutive QSO number.
POINTS — Five QSO points for contacts within your own continent, 10 QSO points for contacts outside your own continent. Five bonus points for each US Novice station contacted in the 10 metre contest. Novice stations are easily identified as they are the only ones giving out contact numbers.
MULTIPLIERS: One multiplier for each US state, Canadian area and DXCC country worked (excluding the US or Canada).
FINAL SCORE — Total QSO points times the Multiplier points.
AWARDS: A plaque to each World Champion winner on each band (minimum of 500 contacts). Certificates in each class in each US state, Canadian area and DXCC country (minimum of 200 contacts).
DISQUALIFICATION: Taking credit for duplicate contacts in excess of three percent of the total made can mean disqualification. There is a stiff penalty of 100 QSO points for each duplicate contact for which credit has been claimed, and failure to comply with the rules and regulations and unsportsmanlike-like conduct.

A summary sheet showing the scoring and other essential information and a dupe sheet for entries with 300 or more contacts is required.

It is suggested that you send a large SAE and return postage to the Contest Chairman, Bill Gosney KE7C, 2665 N Busby Road, Oak Harbour, WA 98277 for official forms.

Mail separate entries to the individual directors listed below postmarked **no later** than February 18, 1988.
10, 15, and 160 metres — Russ Blair KE7KF, 2113 East 10095 South, Sandy, UT 84092.
20 and 75 metres — Ron Johnson WE7H, 68 South 300 West, Brigham City, UT. 84302.
40 metres — Dennis Younker NE6I, 43261 6th Street East, Lancaster, CA. 93535.

COMMONWEALTH CONTEST

Though not mentioned with the rules for the 1988 contest published last month, medallions will again be presented to the VK winner and to the state team of four, as in previous years.

In *Amateur Radio*'s coverage of the results of the 1987 contest, only the scores of the top 10, and all the VK and ZL entrants were shown out of a total entry of 149. Among the remainder were many of those that we would love to pick up for those extra bonus points, ZD8, Z2, ZC4, 5B4, 9J2, ZB2, 8P9, VP2M, 5N, 9M, etc.

Many of these seem to operate only at a time when their signals cannot be heard in this part of the world. and it has been suggested that VKs target some of these areas by letter enclosing a copy of the rules and suggesting that many VKs would like to work them in the contest.

A couple of VK3s have agreed to survey the bands for the next couple of months and note who is active on CW in these areas, and that includes ZL4!

John VK3ZC suggests that those willing to give this scheme a try send him a SASE which he will return with a copy of the rules and the call and QTH of a station who might be persuaded into taking part at a time when signals might make it through to VK.

John's address is John Tutton VK3ZC, 11 Cooloongatta Road, Camberwell, Vic. 3124.

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How's DX?

WORKED ON THE EAST COAST SEPTEMBER 1987

JW5E, SSB on 14 MHz.
QSL to LA5NM.
Operator Rom says that, beside September, March is the other month when propagation is the best to this country across the North Pole.

BY4AOM, from Shanghai, SSB on 14 MHz.
QSL to PO Box 227, Shanghai.
Operator John, excellent and beautiful English. Aged 68, his mother was an English lady.

T32BE, CW on 3.5 MHz.
QSL to WC5P (prompt reply card received).
Operator Paul was on Christmas Island in the Pacific.

ZC4EE, CW on 14 MHz.
QSL via the bureau to Nick in Nicosia.

HG19HB, CW on 14 MHz.
QSL via bureau.

CR6BWW, special commemorative call sign for 60th anniversary.
QSL to CT1BWW.

OCTOBER 1987

C21XX, SSB on 1.8 MHz.

HX2FV (France), special call sign for the blind. SSB on 14 MHz.
QSL to FF6URA.

IO1IIC, SSB on 14 MHz.
This is a special call sign for the Genova (Italy) International Communication Institute.

YI1BGD, SSB on 14 MHz.
Operator Rajed in Baghdad.

GB2URR, SSB on 14 MHz.
Special event station. Operator Gary, West London, near Uxbridge. Opening day of the Brunel University.

A92EM, SSB on 14 MHz.
QSL via bureau.
John in Bahrain.

KG6SL, SSB on 14 MHz.
QSL via WA6AHF.
Bert is on Saipan.

9M2SXI.
Jamboree on the Air station in Penang.
Operator Mal.

VU4GDG/TS.
QSL via VU2GDG.
This is the DX operation on Andaman Island. Worked Gopal CW on 21 MHz and SSB on 21 MHz.

Some rare call signs during the CQ WW DX Phone Contest were:
HS0A, HC1OT, P40T, HC8DX, HK4R, DX1A, P40V, PY5EG, KH2F/P/KH4 (Midway Island, QSL via N2AU), CW8B (Uruguay), PJ1B, L2D (QSL via LU5EIC). (What do other amateurs think of the International Regulations regarding amateur call signs? L2D? !)
These contests are a must for prefix hunters.

WORKED ON THE EAST COAST OCTOBER 26 — NOVEMBER 8, 1987

14 MHz

KH0AC, Saipan.
Operator Len, QSL to K7ZA.

KL7LF/P/KH3, Johnston Island.
Operator Joe, QSL to KL7VZ.

GB2RNX, CW Special Event Station representing the Royal Naval Auxiliary Service celebrating 25 years Silver Jubilee.
Operator Bill. Special QSL card will be sent.

9K2KW, Kuwait.
Operator Farid, QSL to 9K2DT.

PZ1DC, CW in Panamaribo, Surinam.
Operator John, QSL via the bureau. Interested in Australian awards.

PY1QN, CW in Rio de Janeiro.
Operator Ben, QSL via the bureau.

CX1DM, CW in Uruguay.
Operator Harry.

9Y4JJA, Pala Seco.
Operator Joe, QSL via the bureau.

4S7PVR.
Operator Paul, QSL to F6FNU.

21 MHz

ZK1XE, Raratonga.
Operator Peter OH1RY, on South Seas DXpedition. QSL to OH1RY.

FR5EL, Reunion Island.
Operator Michael from Le Tampon.

There was an excellent opening on 28 MHz to Europe, short path, on November 8, 1987 between 0700 and 1100 UTC.
About 38 CW QSOs were conducted. Most of the European countries were contacted — it was almost a contest-type of operation.

—Contributed by Steve Pall VK2PS

DXAC PRESS RELEASE

DXCC-CW ROLL BACK DATE

The ARRL DX Advisory Committee (DXAC) was to vote last October on whether to recommend rolling back the start date of the DXCC-CW award to 1945 to coincide with other awards. Many DXers feel that the CW award should have preceded, or at least have had the same start date as other more modern forms of communication.

ARUBA

The DXAC were also to vote in October whether to recommend that Aruba be added to the DXCC Countries List. The last vote on this matter was defeated as a result of a tie vote. Usually a petition is not considered again until a lapse of two years, but the chairman may waive this waiting period if he estimates sufficient additional information has been received to reconsider the petition. This discretionary privilege was exercised in reference to Aruba.

ARAB DEMOCRATIC SAHARAU REPUBLIC

The Lynx DX Group of Spain has petitioned the ARRL for recognition of the above Republic as a new DXCC country. The Lynx group have provided excellent supporting documentation and there has not been any adverse comments from within the DXAC on the petition. The vote was scheduled for December 15, 1987 and if the votes were affirmatively, the DXAC would probably recommend that the effective date be made rectroactive.

RESTRUCTURING THE DXCC

The DXAC is listening to the DX community's comments and recommendations on this matter, and assessing the practical application of many suggestions. It appears as if there will be some recommended changes.

The DXAC chairman and sub-committee chairmen for the DXCC study met in Oakland, CA, early in December, to finalise the draft proposals of DXCC rules. The recommended rules were then forwarded to the Board of Directors for consideration. It is unknown how the final product will look, but the DXAC were striving to maintain the integrity and merit of difficulty of the present program, whilst, at the same time, providing fair, impartial and attainable goals.

—Contributed by Ken McLachlan VK3AH from material supplied by John Parrott Jnr, W4FRU, Chairman, ARRL DXAC

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Beacons & Repeaters

Tim Mills VK2ZTM
FTAC BEACON CO-ORDINATOR

This month you will find a list of the Australian beacons and repeaters on the centre pages of this AR. It was taken from the WIA data base. Should there be any errors in the listing of your system, would you write to the Federal Office, PO Box 300, Caulfield South, Vic. 3162, with any corrections.

There has been considerable discussion in VK2 about the expansion of the paging network which is the two-metre band's neighbour at the high end. Both Telecom and commercial networks are expanding and, in time, there will be systems in any part of the country that can support them. This will place a strain on amateur repeater installations as most will find they are either sharing a hilltop with a network or there is one nearby. To date, only VK2, 3, 4 and 6 have repeaters above 147 MHz with about 40 systems operational. (Read comments in the *VK2 Mini-Bulletin* on changes in that State).

Now is maybe the time to have a hard look at the problem and to determine the best solution. It is not desirable to leave the top Megahertz. The Amateur Service should be making full use of all its spectrum and to show other interests that it is being used. Perhaps it would help the repeater operators of systems above 147 MHz if the input and output frequencies of their repeater were reversed. This would place the input an additional 600 kHz away from the top of the band. Reversal has occurred with two systems in Brisbane. Telecom channels are at the low end of 148 MHz, starting at 148.0125 MHz. The commercial systems start from about 148.500 MHz and the pager band extends to 150 MHz. Typical power (EIRP) are quarter, half or one kilowatts and in major population centres there is likely to be more than one transmitter in operation. Most networks are expanding outside the major cities to provide regional, State or national coverage. As the use increases, so does the on air time.

It is also time to consider the question of tone access. The chief advantage would be to keep the repeater quiet until required. It would not, however, prevent interference from a paging network if the problem was already occurring.

The operating frequencies for repeaters have been determined in the past and the results of various decisions from the present national band plans. Before any major change can occur it requires all interested parties to provide an input. During the holiday period both repeater groups, as well as interested users, should do some thinking on the possible changes to enable the Amateur Radio Service to live with its neighbour — *the Pager.*

I will discuss this subject further in these notes, next issue. A happy New Year to all.

73, Tim VK2ZTM

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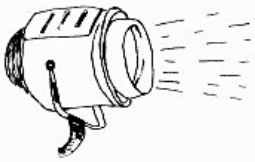

Spotlight on SWLing

Robin Harwood VK7RH
52 Connaught Crescent, West Launceston, Tas. 7250

Well, another year has arrived, in fact, our Bicentennial Year! So, it is Happy Birthday Australia on the 26th of this month. This will mean that many of the international stations are likely to schedule special programming beamed to this region. I do know that the BBC World Service are going to be one.

Our own Radio Australia is also going to be having special programming to celebrate out Bicentenary throughout the year. Incidentally, RA came into some flak in November when they decided to drop the Australian 10 minute news bulletins to three minute capsules after the World News every two hours. This naturally is bound to upset Australian expatriates throughout the world, who specifically tune in to get news from home. They certainly do not want news from the South Pacific, but home-news! By the time this is in print, they may have altered their decision. I believe the decision was brought about by budgetary cutbacks.

They have instituted a positive decision in providing a 24-hour Answerline though, which is similar to that of Radio Netherlands. This allows listeners throughout the world to phone Radio Australia and leave a message on the answering machine, speeding communications between the listeners and the program makers.

On September 30, 1987, Time and Frequency station, VNG, at Lyndhurst closed down at 1359.59 UTC for the last time. This left several VNG users in the lurch, including many amateurs and SWLs. But about 10 days later the Royal Australian Navy activated an experimental time station from Belconnen, in the Australian Capital Territory, using two 10 kW senders into monopole antennas. They are on 6.448 MHz USB and 12.982 MHz USB continuously. They are using a Caesium standard, which has been co-ordinated to UTC by this time, but there are no identification announcements or other means to let the listener know. The service, being experimental at this juncture, could become permanent, depending on the numbers using the service, so announcements and identification could come later. You will have noted that the service is within the maritime allocation, but it should be noted that this experiment is being run by the National Standards Council, and the RAN has provided the wherewithal.

Last month, I neglected to nominate the most improved international broadcaster during the past year. In my opinion, the World Service of Radio Moscow should get this honour, particularly towards the last quarter of 1987. Their improvements in reporting domestic news and instituting off-the-cuff discussion programs, has made it more interesting to listen to RM these days. This is primarily because of "Glasnost" or openness. This is also evident in some programming, yet the anti-American bias is still prevalent, especially in the international news and commentaries. It is, to me, the comments on what is happening internally within the USSR, that has been interesting, compared to the old propaganda line that the Soviet Union is "paradise."

RM has also improved their presentation style and their programming is up-to-date, particularly the World Service. The separate North American Service of RM has been operational for many decades, and their presentation has also been more sophisticated and polished to that of the W/S, which has only come on-air in the past 10 years. Unfortunately, I have not been able to judge their style lately, as the North American Service is not audible at this location, compared to the W/S which is easily found.

But I am convinced that the award for the most consistently bad presentation and programming content should go to Radio Pyongyang, in North Korea. I must confess that it is the most boring station I have ever heard. It hasn't changed over the years. The only significant improvement is their signal strength.

Two interesting DX catches I received in September were in different parts of the world. The first one, the Falkland Islands Broadcasting Service came-up on 3.958 USB from 0600 until around 0900, but it is very weak. It carries programming from the British Forces Broadcasting Service (BFBS) in London, via satellite, until local programming begins around 1000 UTC. This rare station is usually heard around the Equinox here in south-eastern Australia. They are also very difficult verifiers as they are sticklers for accuracy. A QSL from this station has to be earned.

The other station is Radio Clarin, in the Dominican Republic. I heard it via the Long Path at 2150 UTC on 11.700 MHz, with typical Latin programming and plenty of identification. The interesting facts is that I first heard it on my Sony ICF 7600D portable. It was at fair to reasonable strength. The station only runs about five kilowatts and can be easily over-powered by adjacent stations running 10 times more power. This was the station that carried both Radio Earth and the "La Voz dell CID" but I don't think it carries either of them now. It is a commercial operation, yet it came under government pressure to terminate the anti-Castro programs after Cuban complaints. Radio Earth simply ran out of money.

Well, that is all for this month. Have a happy Bicentennial weekend at the end of the month!

Good listening — Robin VK7RH.

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Intruder Watch

A very Happy New Year to all! We've heard a lot about our Bicentennial, and now here it is. I hope the ionosphere puts on a good show to mark the occasion.

September 1987 saw a good response from Intruder Watchers around Australia, with a summary of reports that had me working the word processor overtime. Contributions were gratefully received from: VK2s CXX, MUZ and QL; VK3s AMD and XB; VK4s AKX, BG, BHJ, BTW, DA, DFR, KHZ and OD; VK5s GZ and TL; VK6RO, VK7s DQ and RH; VK8s HA and JF.

Broadcast intrusions reported totalled 151; CW 163; RTTY 78; other modes accounted for 90 reports, and 31 intruders told us what their call signs were. (But very cryptically!).

The 10-metre signals coming from north-west of us are apparently increasing, with many being heard and reported from observers in the north of Australia. (VK4 and 8). I predict, as I did some months ago, that this will become a serious problem for 28 MHz amateur operators, and I urge those who hear the signals to send in a report of what they hear. It is no good waiting until 10 metres is full of unauthorised stations before complaining.

The CW station sending "V" on 7.002 MHz has been positively located at Vladivostok, USSR, and is apparently (quote) "in the USSR Maritime Service" (unquote). A friend of the notorious "UMS" perhaps? This pest is being heard and reported in all IARU Regions. The ARRL has sent documentation to the United States FCC Treaty Branch regarding both the above CW nuisance and "UMS". We hope that the FCC can have something done about them.

And, on to the mode for the month: A3E. This is the AM mode, of course, and needs no description. When can we label it an intruder when we hear it on amateur frequencies?

On the 80 metre band, it is an intruder over the whole band. On the 40 metre band, it is an intruder only between 7.0 and 7.1 MHz. It is certainly **not** an intruder over 7.1 MHz, as this segment of the band is shared by amateurs and the broadcasting service. On the 20 metre band, an AM broadcast is always an intruder on the amateur-allocated section; ie 14.000 to 14.350 MHz. Although the segment 14.250 to 14.350 MHz is shared, it is **not** shared with the broadcasting service. On the 15 metre band, an AM broadcast is always an intruder on our segment, that is, between 21.000 and 21.450 MHz. On the 10 metre band, an AM broadcast is always an intruder on our segment, that is, between 28.0 and 29.7 MHz. Note that we refer to *non-amateur* transmissions in the AM (A3E) mode. Next month we will consider the mode R7B.

73 for now and take care.

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MODERN EDUCATION

A document has fallen into our hands which throws new light on an eternal mystery: what teachers really mean by the comments they write on report cards.

REPORTS ON PUPILS

Many teachers have expressed a need for a checklist to appropriately describe pupils in their care for the purpose of reporting to parents. This document may be of some assistance.

COMMENT	INTERPRETATION
Satisfactory progress	I can't think of a single interesting thing about him/her
A born leader	Godfather type
Easy going	Bone idle
Lively nature	Disruptive
A sensitive child	Never stops whining
Helpful	Creep
Reliable	Dobs in his mates
Good at contact sports	Thug
Friendly	Never shuts up
A rather solitary child	Has nits
Works better in a small group	Daren't take my eyes of him/her for a second
Needs encouragement	Thick as a brick
Often appears tired	Stays up all night watching late movies, or is glue sniffing
Good at practical activities	Illiterate
All work is of a high standard	Has ambitious, middle-class parents
Forging his way steadily ahead	Cheats

—Reprinted from the *Sydney Morning Herald* and contributed by Tim Mills VK2ZTM

BICENTENNIAL EXHIBITION, WODONGA, January 1-5, 1988

The Twin-cities Radio Club, Albury-Wodonga, will be establishing a display depicting the history and development of radio and electronics in Australia. The display will be in conjunction with the National Travelling Exhibition, which will start from Wodonga.

There will be an award station on HF and VHF from January 1 to January 31, offering a certificate to stations making one contact with the special event station at the display, or any club member station. A special call sign, either an AX or VI has been applied for.

Amateurs Australia-wide are invited to the border tourist area to see the huge displays and live enactments.

Further details are available via FAX (060) 56 1030, or PO Box 396, Albury, NSW. 2640.

—Contributed by Scotty VK3ZR

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Awards

Ken Hall VK5AKH
FEDERAL AWARDS MANAGER
St George's Rectory, Alberton, SA. 5014

AWARDS ISSUED IN OCTOBER

HEARD ALL VK CALL AREAS

133 Sergey N Sherchenko UA3-121-2194
134 Pokhmelnov Alex UA1-169-777
135 Valery N Pureskin UA4-094-516
136 Semin A A UA4-164-286

WORKED ALL VK CALL AREAS

1552 Yoshio Kimura JA7UMN
1553 Peter Marmet HB9DCZ
1554 Victor U Kullit YC0GVT
1555 Alan McLauchlan ZL2AVA
1556 Eisuke Saji JA2NNF
1557 Ron Moorefield W8ILC
1558 Haruki Oue JR3EQA
1559 Tsuneo Okuya JG1PII
1560 Bill Morgan K0DEQ

DXCC

Phone
359 Harry Cox VK4OX
360 Maurie Thompson VK6NGG

WORKED ALL STATES — VHF

173 D R St John VK3AQR (144 MHz)

DXCC UPDATES IN OCTOBER

VK3DYL 259 phone
VK2BCH 225/226 phone
VK3JF 308/323 phone 232/247 CW 311/335 open
VK3CSR 260/263 phone

REQUIEM AWARD

ON4RIP (Rest In Peace — Requiescat In Pace) is a special station in commemoration of the third battle in the Ypres Salient Fields (Salient Ypres — Passchendaele). In remembrance of the 70th anniversary of this struggle in which more than 600 000 casualties were counted. A third of these young soldiers, from all over the world, were denied, by the fortune of war, to have a known grave.

In commemoration of this battle, which lasted for 99 days and nine hours, activities are planned by different nations. Radioclub Ypres will participate, and obtained for that purpose, the special call sign ON4RIP. This station will be operated by radio amateurs from the British Commonwealth, France, Belgium, Germany and the USA.

Attention is drawn to the fact that, during the coming months, the remembrance of the 60th anniversary of the unveiling of the memorials for the unknown soldiers 'Tyne Cot' and 'Menin Gate', will take place in the presence of VIPs and members of the British and Belgian Royal Families.

A special certificate/award "Requiem Award" will be issued in co-operation with the city council of Ypres. The rules for the award are to make contact with ON4RIP. The award is also available to shortwave listeners. The fee for this award is 10 IRCs, £5, US$7, 300BF, 15FL, 15DM, 10000 Lira or 15 SFR.

Applications should be sent to: Ieperse Radioclub v.z.w (Radioclub Ypres), PO Box 32, 8900 Ypres (Ieper), Belgium.

INTERNATIONAL AWARDS GUIDE

This huge guide (434 large A4 size pages) describes 1027 amateur radio awards from 74 different countries, with 371 illustrations.

A copy of the guide costs only 1390 Belgian Francs, US$34, or 58 IRCs. Payment in the form of cash or IRCs in a registered letter and International Postal Money Orders will be accepted.

RCY DX BULLETIN

This bulletin is issued 11 times per year (monthly, except in August). A regular issue has 12 pages with up-to-the-minute coverage of DX events. New DX information is included in the bulletin up to two days before mailing!

Rates are as follows:
— Sample copy (air mail) — US$1 or 2 IRCs
— 11 issues by surface mail — US$10 or 17 IRCs
— Trial subscription to five issues (air mail) — US$5 or 8 IRCs.

Contributors can receive free copies of the *RCY DX Bulletin*, but they must have been a subscriber for at least one year.

Send all correspondence to: The Secretary, Ieperse Radioclub v.z.w., PO Box 32, 8900 Ieper, Belgium, Europe.

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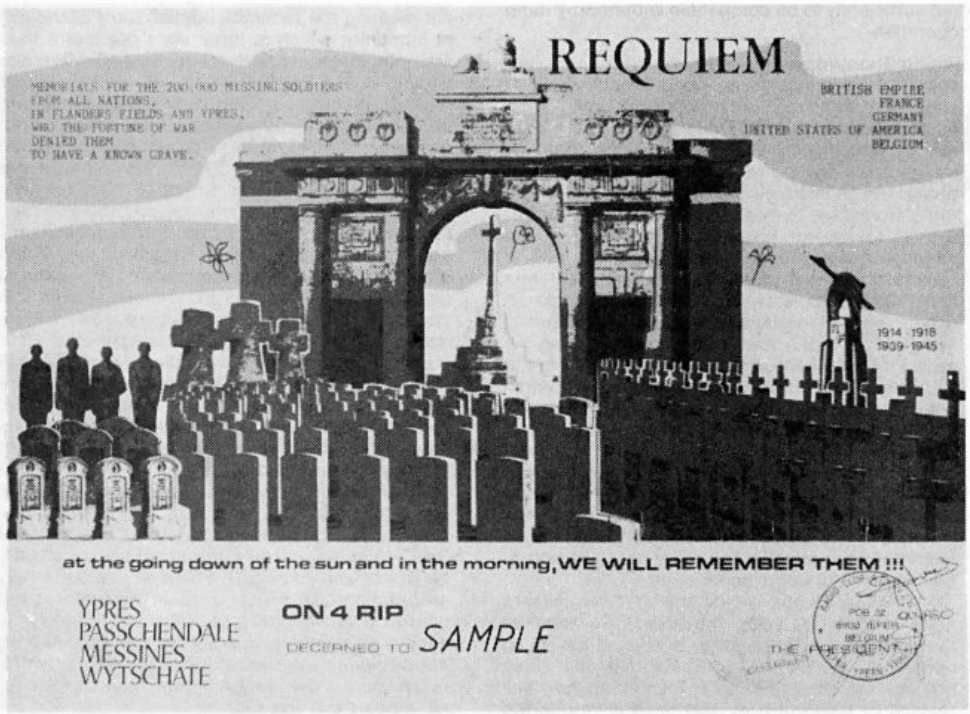

Electro-Magnetic Compatibility Report

Hans Ruckert VK2AOU
EMC REPORTER
25 Berrille Road, Beverly Hills, NSW. 2209

Buying an appliance? You may get RFI you didn't bargain for!

THE LINE OSCILLATOR RFI

The line frequency oscillators in television sets drive the horizontal scanning circuits and provide the necessary 25 kV plus high tension. The horizontal output pulses contain very strong harmonics, which may be radiated by the television chassis, the mains lead, the antenna or cables connecting to other equipment. Older television sets had a metal chassis, a three-core cable with earth connection and some shielding of critical circuit sections. RFI from these older sets was usually weak even at only two to three metres distance. Therefore, the standards for low frequency RFI (15.625 kHz fundamental) did not mention this source of RFI particularly, and a fairly high level of radiation at three metres distance was permitted, on the assumption that no problem existed.

Unfortunately, this is no longer so, because these days it is not the engineer, but the sales manager who determines what is to be left out of the design. Several radio amateurs (VK3CQ, VK2CLB, VK3ANJ) tell us that the new television sets cause so much RFI, that it is impossible to listen to a receiver on any band anywhere in the house (perhaps next-door as well). If you write to the Technical Services Manager of the manufacturer (as per the RFI Assistance List) you may be lucky to get an answer at all. If so, it probably states the half-truth, that "all television sets do this, it is a matter of distance (television to radio), where the RFI fades out, and the television set has been designed to meet Australian Standards!" The important fact is, that it depends only on the television design at what distance the RFI fades out sufficiently to be compatible with nearby radio operation.

Going Shopping

Arm yourself with a good medium-wave/shortwave transistor radio when shopping for a television set. Hold the radio close to the television. Tune in about 530 kHz away from any strong radio station so that the AGC does not reduce the sensitivity of the receiver. Move the radio around the television and swing the receiver around to receive the best reception from the directive ferrite antenna of the receiver.

Hold the receiver close to the television antenna cable and also close to the mains cable to ascertain whether these wires radiate a strong signal. Move slowly away from the set, turning the radio for best RFI reception. Observe whether the RFI fades out completely at three to five metres distance. Tune in a strong local AM radio station and hold the radio close to the television. An acceptable television set will show no RFI from line frequency oscillator harmonics at medium wave frequencies at three metres distance, tuned away from the station, and at one metre distance when tuned to local AM stations. We can then recommend this make and model of television to our family, neighbours and friends.

Next, one should repeat the test somewhere near 14-15 MHz, using the shortwave receiver range. The result should be similar. If the sales personnel do not like your test ask the sales manager to state on the invoice that they will replace or take the television back or refund the purchase price in full should the set cause unacceptable RFI to your radios and shortwave receivers/transceivers. If this is unacceptable, go to another shop!

It would be interesting to hear of your experience.

What to do if you are stuck with a RFI Lemon!

A coaxial cable separation transformer should be installed between the television set antenna terminal and feeder. This will be even more effective if the transformer is placed close to the tuner input terminal inside the television set. The German firm, Blaupunkt, found that removal of the 470 pF safety capacitors at the television antenna terminal reduced the radiation of unwanted line frequency harmonics by 20 dB. It is well-known that capacitive coupling has "high-pass features", whilst inductive coupling has "low-pass features". (See AR, March, page 49, for separation transformers).

If possible, use a three-core mains cable, and earth whatever chassis is left. Consult the circuit to see whether earthing is possible, so that a short circuit will blow the mains fuse (if there is any). In addition, all cables which go to the television set may be wound through ferrite rings of high μ and low Q. These rings act, with a few cable turns, as RF chokes.

TESTING THE VCR

The German Post Office (FTZ = DOTC) recommends (pamphlet 8.79/654321) that the sales manger of the shop agrees, in writing, (on the invoice) that he will exchange or take back a VCR should it show too great susceptibility, obviously not meeting the recommendation (now Standard) of immunity, which is three volts per metre field strength in the critical range of 1-10 MHz (especially near 3.500 and 7 MHz). It has been found that appliances carry the type approval number, but too often they do not pass the test and do not deserve the type approval. This is also the reason (stated by DL1BU) that, in RFI collision cases, the radio inspector no longer relies on type approval numbers, but uses his own test television set, radio or VCR, attached to the complainant's antenna, etc, to see who is to blame — the amateur or the appliance manufacturer — and to demonstrate this fact to the customer. Many VCRs have been quietly exchanged by the dealers if, for example, the local broadcast station or other legal transmission could not be handled by the VCR.

DL9AH (CQ-DL 7.1986) recommends taking a hand-held transceiver to the shop. Even two metres and 70 centimetre hand-held transmitters have sometimes been strong enough to sort out the worst cases. A description of a 3.500-3.800 MHz mini-transmitter with up to six watts RF power follows.

A loading coil allows reducing the length of the 3.500 MHz whip antenna. With this test transmitter it is possible to check VCRs and to find if they are compatible with 80 and 40 metre band operation. Building such a transmitter could be a capital city amateur project by a group, making the equipment available to those who intend to purchase a VCR. Any amateur might assist his neighbours this way too.

RFI FROM AND SUSCEPTIBILITY OF MOTOR CARS

If a radio amateur wishes to operate mobile and intends to purchase a motor car, he/she should find out in advance whether radio operation is compatible with the selected car. It is increasingly common that modern cars do not only produce ignition hash which may be difficult to cure, there is also RFI from micro-processors and timing-devices, affecting VHF reception. In some cases, electronically controlled car operations are affected by the VHF transmitter.

QST reported about the W-amateur who had bought a new car which showed malfunction as soon as the VHF transmitter was used. When the amateur complained about the lack of shielding in the car's wires leading to sensitive parts, the dealer recommended that "the amateur should shield his antenna, which would be far simpler!". Learning the lesson again, we should take a hand-held transceiver to the car dealer. Use the transceiver during the demonstration run around the block and find out if anything happens. Five watts output could be effective with a rubber-duck antenna inside the car near the dashboard wiring. When the car is stationary with the bonnet open, one could test whether the transmitter affects the functioning of engine, lights, wiper, etc.

Cars with micro-processor controlled dashboard instruments, anti-locking brake systems, or cruise control, are more likely to be affected by transmitter radiation. It has been reported that some of these devices were found to fail when the car was driven near a high power radio station. It is better to be careful first, than sorry later.

To check the behaviour of the car electronics when shortwave operation (mobile 14 MHz, etc) is intended, one may not have a hand-held transceiver. We can use a one watt input, or more, GDO or oscillator, which is also suitable to check the susceptibility of VCRs. No antenna is required if the coil has a large enough diameter, say two to three centimetres. For VCRs, the frequency of the test-oscillator should be between 5 and 6 MHz. The VCR is switched to replay. The oscillator coil is held close to the slot where the tape is inserted. Picture or sound may be affected.

If the test oscillator has six to seven watts DC input, it will most likely affect the picture and sound when less than 40-50 centimetres away from the VCR. Less sensitive is the VCR-to-television input connection, if the oscillator is held close to the VCR RF input terminal. One can also see the beneficial effect of a shielded high-pass filter inserted between the antenna and the VCR. It should not be much of a problem to build a 5-6 MHz transistor oscillator, having one watt DC input power, to be able to check appliances prior to paying for them, as regards interference and/or susceptibility. Some may be 10-30 times more affected than others.

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Australian Ladies Amateur Radio Association

Joy Collis VK2EBX
PUBLICITY OFFICER, ALARA
Box 22, Yeoval, NSW. 2868

Welcome to 1988 — Australia's Bicentennial Year, and hopefully a year of increased YL activity around the amateur bands.

Perhaps a brief look back at some of the achievements of 1987, before we finally dust the old year down and file it carefully away.

Our most memorable activity of the year was, of course, the ALARA-meet in Adelaide, which brought together members from five Australian States, plus New Zealand, and was an outstanding success.

The ALARA Contest, held on November 14, saw finalisation of the Five Year Trophy. (A contest report next month).

Our Birthday Activity Day was held on July 25, a good opportunity to catch up with old friends, and make new ones.

Several ALARA members assisted with JOTA stations in October, and found the activity challenging and stimulating.

There were individual achievements too.

Plaques for outstanding service to ALARA were awarded to:
Marlene VK5QO, Valda VK3DVT, Helene VK7HD and Mavis VK3BIR.

Raedie Fowler received a special certificate for her contribution to ALARA over the years.

Liz W3CDQ, has been an active amateur radio operator for 65 years.

Jan VK3DMH, (now VK3HD), operated the VI3PVA call sign (issued to the amateur radio club Polonia in honour of the Pope's visit to Australia).

Joan VK3BJB, continued her Japanese studies by radio, and assisted with marine-mobile communications for Japanese yachts competing in the Melbourne to Osaka Yacht Race in March.

Mavis VK3KS, received a silver coaster when she gained first place in the VK-YL section of the WARO Contest.

Jenny VK5ANW, was re-elected as VK5 Divisional President, and Christine VK6ZLZ became Vice-President of the VK6 Division, with Gill VK6YL, also being elected to the Council.

Maggi VK3CFI, worked the John Moyle Contest solo from a hill.

Bev and OM Brian (VK6s DE and AI), logged nearly 200 calls when using the Special Event Call Sign, VK6CUP.

June Greenaway L60068, was the first VK6 SWL to qualify for the VK6CUP Award, with her grand-daughter, Leeanne, the youngest SWL to attain it.

Helene VK7HD, was awarded a 75th Anniversary WIA Medallion.

Elizabeth VE7YL, gained first place in the CW section of the YLRL/OM 1987 Contest.

Several ALARA members upgraded their call signs during 1987, and it was a pleasure, also, to see many new YL call signs appearing on the bands.

YL CONTESTS

YL-OM CONTEST sponsored by YLRL

PHONE: starts Saturday, February 13, 1988 at 1400 UTC and ends Monday, February 15, 1988 at 0200 UTC.
CW: starts Saturday, February 27, 1988 at 1400 UTC and ends Monday, March 1, 1988 at 0200 UTC.

All licensed women and men operators throughout the world are invited to join in. OMs call "CQ YL" and YLs call "CQ OM".

All bands, no cross-band. Net contacts and repeater contacts do not count.

A station may be worked and counted once on each band, work only 24 hours of the time, operating breaks must be indicated in log.

Exchange — station worked, QSO number, RS/T, state/province/country.

Score —
a. phone and CW will be scored as separate contests, submit separate logs for each contest.
b. one point is earned for each different station worked on each band, YLs count only OMs and OMs count only YLs. Add the QSO points earned, that is your total number of QSOs.
c. multiply the number of QSOs by the total number of different states/provinces/countries worked.
d. contestants running with a power output of 100 watts or less on CW and 200 watts PEP or less on SSB at all times may multiply the results of c. by 1.50 (low power multiplier). Maximum power output that may be used at any time during the contest is 750 watts on CW and 1500 watts PEP on SSB.

All logs must show your state/province/country to qualify for awards. If you have 200 or more QSOs submit a separate log for each band and submit a dupe-sheet.

Logs must show claimed score and be postmarked by March 15, 1988. Send logs to: YLRL Vice-President, Carol Shrader W14K, 4744 Thoroughgood Drive, Virginia Beach, VA, 23455. USA.

YL-OM MID-WINTER CONTEST

Participating clubs — BYLARA, BYLC, DYLC, YLRC

Weekend — January 9-10, 1988
CW: Saturday, January 9, 0700 to 1900 UTC.
Phone: Sunday, January 10, 1988, 0700 to 1900 UTC.
Bands: 3.5 to 28.700 MHz.
YLs call "CQ Contest" or "CQ Mid-Winter Contest".
OMs Call "CQ YL".
YLs work YLs and OMs, OMs work YLs only.
Exchange: station worked, RS/T, QSO-serial number, OMs start at 001, YLs start at 2001, country.
Entry must also show time, Band, date, YL or OM, number of multiplier.
Points: each QSO with a YL, confirmed, count five points, each QSO with OM count three points, one station may be worked only once on each band.
Multiplier: one point for every worked DXCC country, multiplier is counted only once in the contest, it is not counted on each band.
Final Score: multiply the sum of QSO-points by total number of different DXCC countries worked.
SWLs: each different heard YL station counts five points, multiplier as above. Logs must also show the foreign station worked with.
Logs: a score calculation is required, use a multiplier column and insert multiplier, log has to be signed. If you participate in CW and phone send two logs.

Logs to be sent, prior to February 19, 1988, to DYLC, PO Box 262, 3770 AG Barneveld, Netherlands.
Awards: certificates will be awarded to YL and OM winners in each category, and to second and third stations. Certificates also to each country winner in each category.

Wishing you all a happy New Year.
73, Joy VK2EBX

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The ladies at ALARA-meet, which was held in Adelaide on September 26-27, 1987. Back Row (from left): Carol VK5PWA, Pat Stuart, Joan VK3NLO, Christine VK5ZCQ, Muriel May, Nancy VK2NPG, Denise VK5YL, Angela Shaw, Margaret VK3DML. Centre: Valda VK3DVT, Gill Wardrop, Joy VK5YJ, Bev Tamblyn, Joy VK2EBX, Margaret VK4AOE, Marlene VK5QO. Front: Maria VK5BMT, Poppy VK6YF, Meg VK5AOV, Marilyn VK3DMS, Jenny VK5ANW, Vicki ZL1OC.

WICEN News

Dennis Gibson VK1DG
ACT WICEN CO-ORDINATOR
39 Lyall Crescent, Kambah, ACT. 2902

CAN YOU HELP MAKE IT GREAT IN '88?

In the months February and March 1988, ACT WICEN will be seeking your help in providing a nation-wide communications network for the Australian Bicentennial Castrol World Rally for vintage and veteran cars. A veteran car is one of those delicate mechanical contrivances built before 1919, and a vintage car is one of those sturdy stylish vehicles constructed between 1919 and 1930. *Castrol Australia*, the *Veteran Car Club of Australia*, and the *Australian Bicentennial Authority* have teamed together to bring Australia its own history-making event as part of the official celebration of our great country's Bicentenary. The ACT WICEN group has been engaged by the Rally Executive Director in Canberra, Mr Ian Irwin, to provide communications.

The event comprises seven separate rallies, from West Australia, Brisbane, Sydney, Melbourne, Darwin, Adelaide and Hobart, with 56 stopover points on the way to the finish in Canberra. It is hoped that WICEN can provide a network consisting of an HF amateur station at each of the stopover points, to keep the rally headquarters, in Canberra up-to-date with the events of the day, and to allow limited message traffic to be sent to the rally organisers in the field.

ACT WICEN have assumed the responsibility for the net control stations, and the overall organisation of the communications exercise, with the help of each State and Territory WICEN groups, and other interested amateurs. The exercise has the endorsement of the Federal Executive of the Wireless Institute of Australia as part of our 1988 Bicentennial celebrations.

It is the rally organisers responsibility to contact the radio operator and to generate or receive messages, and the radio operator's responsibility is to establish contact with the net control station VK1WI, in Canberra. Stopover stations will only be required to be active on the evening of the required date, and communications will be conducted using USB on the primary WICEN frequencies of 7.075 MHz from 8.30 pm; 14.125 MHz from 9.00 pm and 3.600 MHz from 9.30 pm. (Times are in EAST). Secondary frequencies will be up 25 kHz in cases of severe QRM. Up until the start of the rally contact may be made with the VK1 contingency after the VK1 Sunday Evening Broadcast on 3.570 MHz.

The message traffic is expected to be very light and will mainly comprise information about the status of the vehicles and crew. The worst case traffic density for stopover stations will involve three consecutive evenings, except for Adelaide with four evenings, and the net control station in Canberra, which will be active from February 20 to March 16, inclusive.

Following is a list of the stopover points and dates. If you are able to help with this exercise in any way, please contact your area WICEN co-ordinator, from the following list, or the VK1 Division of the WIA, by writing to GPO Box 600, Canberra, ACT. 2601, indicating which stopover station/s you can maintain, and on what dates. It is essential that this information is received as soon as possible, as the rally organisers in the field need to be advised of who to contact at each stopover, in advance. Even if you are unable to assist with communications for this worthwhile event, take the time to go out and see this most unique collection of ancient vehicles ever to grace our shores, and show your children what 'real' motoring is all about!

COME ON, GIVE US A HAND!

1988 CASTROL RALLY WICEN OPERATOR LOCATIONS AND DATES

AUSTRALIAN CAPITAL TERRITORY — VK1

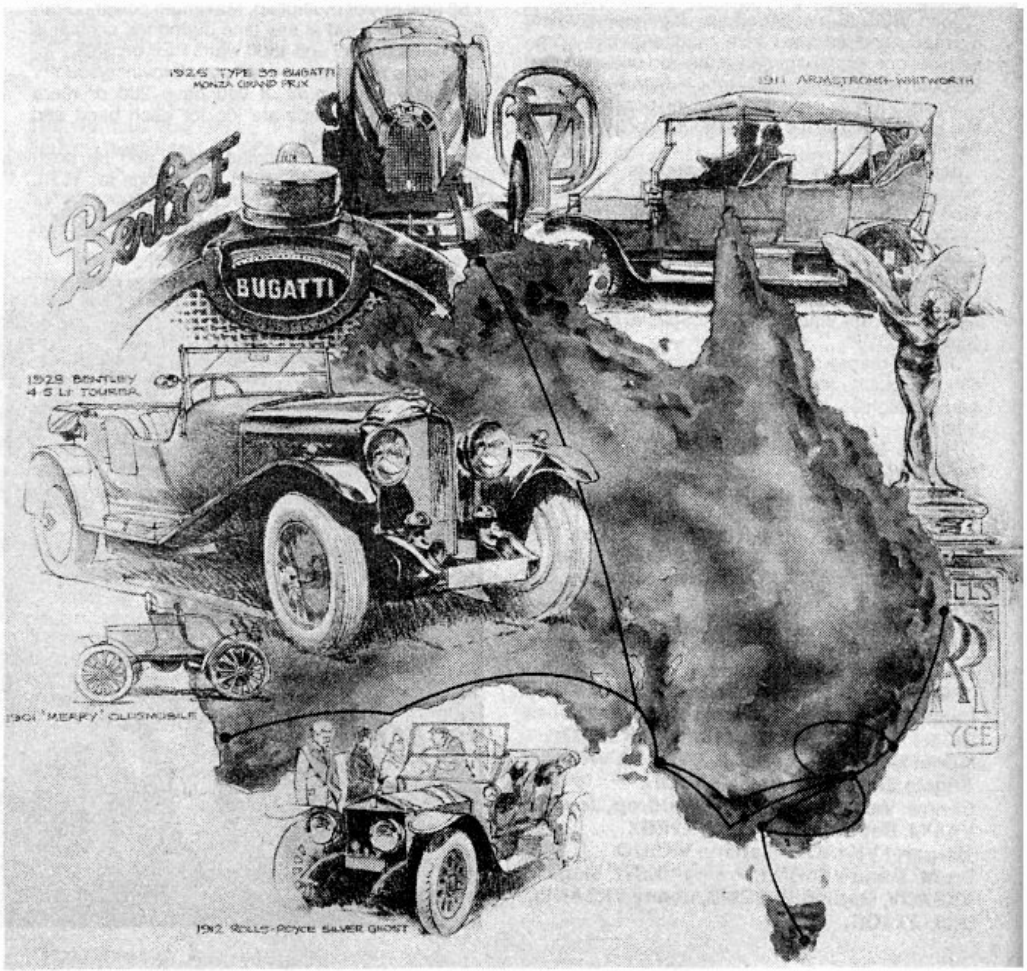
Canberra	February 20, 21, 25 February 27 to March 16, inclusive.

NEW SOUTH WALES — VK2

Ballina	March 7
Bathurst	March 9
Coffs Harbour	March 8
Cooma	March 15
Cootamundra	March 12, 13, 14
Dubbo	March 11, 12
Finley	March 11
Goulburn	March 14
Gundagai	March 15
Holbrook	March 14
Jerilderie	March 11
Maitland	March 11, 12
Merimbula	March 14
Narrandera	March 12, 13
Orange	March 9, 10
Pambula	March 14
Parks	March 10, 11
Parramatta	March 8
Port Macquarie	March 9, 10
Richmond	March 8
Sydney	March 7, 13
Tumut	March 14
Wagga Wagga	March 13, 14, 15
West Wyalong	March 14
Windsor	March 8
Yass	March 15
Young	March 12, 13

VICTORIA — VK3

Bairnsdale	March 12
Ballarat	March 10, 11
Beechworth	March 13
Cann River	March 13
Caulfield	March 11
Echuca	March 12, 13
Lakes Entrance	March 12, 13
Melbourne	March 10
Mildura	March 10
Moe	March 11
Morwell	March 11
Seymour	March 12
Swan Hill	March 11
Traralgon	March 11
Wangaratta	March 9, 10



QUEENSLAND — VK4

Brisbane	March 6, 7

SOUTH AUSTRALIA — VK5

Adelaide	March 6, 7, 8, 9
Bordertown	March 9
Ceduna	March 3, 4
Port Augusta	March 5
Renmark	March 9

WEST AUSTRALIA — VK6

Balladona	March 1
Eucla Motel	March 2
Kalgoorlie	February 29
Merredin	February 28
Perth	February 27, 28

TASMANIA — VK7

Devonport	March 8

NORTHERN TERRITORY — VK8

Alice Springs	February 25
Darwin	February 20, 21

STATE AND TERRITORY WICEN CO-ORDINATORS

VK2 Steve Boyd VK2DNN
4 Wisdom Street,
Arnandale, NSW. 2038
Ph: (02) 660 4783 home

VK3 Leigh Baker VK3CDP
552 Canterbury Road
Vermont, Vic. 3133
Ph: (03) 873 3417 home
Ph: (03) 609 1365 work

VK4 Ken Ayres VK4KD
142 Castle Hill Drive,
Nerang, Qld. 4211
Ph: (075) 58 2293 home

VK5 Bill Wardrop VK5AWM
Box 303,
St Agnes, SA. 5097
Ph: (08) 251 2154

VK6 Jack Shurmer VK6QS
15 Blackford Street,
Mt Hawthorn, WA. 6016
Ph: (09) 444 3427 home

VK7 Alan Ruthven VK7ZAR
Box 94
Lindisfarne, Tas. 7015

VK8 Trevor Connell VK8CO
Box 40114
Casuarina, NT. 5192
Ph: (089) 27 9256 home
Ph: (089) 20 4431 work

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Education Notes

Brenda Edmonds VK3KT
FEDERAL EDUCATION OFFICER
PO Box 883, Frankston, Vic. 3199

Recently, I came across some old examination papers of the essay type. In view of the continuing controversy over multi-choice questions, I thought it might be of interest to some of the newer members to publish a sample. I would be interested in comments, especially from those who attempted both types of exam.

Remember —

a) it is AOCP level

b) 2½ hours is allowed — approximately 20 minutes per question

c) each question is worth 15 marks approximately.

I also found a couple from about 1920, I will publish these later in the hope that some old timer might be inspired to contribute an article on some of the now defunct equipment and techniques.

See how well you would do with this one, and the amount of ground it covers in comparison with the current ones!

73, Brenda VK3KT

POSTAL AND TELECOMMUNICATIONS DEPARTMENT

(C)

AMATEUR OPERATOR'S CERTIFICATE OF PROFICIENCY

SECTION M (THEORY) AUGUST 1975

(time allowed — 2½ hours)

NOTE: SEVEN questions only to be attempted. Credit will not be given for more than SEVEN answers. All questions carry equal marks.

1. (a) Draw a circuit diagram of the plate-modulated radio frequency amplifier and modulator stages of a 150 watt DC input amateur band transmitter.
   (b) Describe fully how 100 percent modulation is obtained.
2. Assisted by a circuit diagram, describe the operation of a mains operated power supply which uses silicon diodes. The power supply is required to provide a regulated output of six volts to supply a crystal oscillator and an unregulated output of nine volts for the buffer stage of a transistor type transmitter.
3. With the assistance of a circuit diagram, describe the operation of a device suitable for measuring the ratio of forward to reverse power present in a transmission line feeding radio-frequency energy to an antenna.
4. (a) Discuss factors you consider desirable in a microphone used in mobile operation.
   (b) With the aid of a sketch, describe the construction and theory of operation of a microphone which you consider meets these requirements.
5. With the assistance of a sketch showing approximate dimensions explain the theory of operation of an antenna which uses "traps" to enable it to be used for multiband operation within the amateur bands. Show resonant frequency of traps.
6. (a) With the aid of a circuit diagram, describe the operation of a circuit which uses a cavity resonator.
   (b) Over what order of frequencies would a typical cavity resonator be used?
7. (a) Describe the manner by which high-frequency radio waves may be propagated over long distances. Explain why communication between countries such as America and Australia is restricted to certain times in the HF bands.
   (b) Explain why communication over long distances as described in (a) is not possible using the VHF and UHF amateur bands.
8. In relation to a communications receiver, define the following terms:
   (i) signal to noise ratio;
   (ii) cross modulation;
   (iii) selectivity;
   (iv) image rejection;
   (v) automatic gain control.
9. (a) Find the total capacity when three capacitors of 2, 5 and 10 microfarads respectively are connected:
   (i) in parallel; and
   (ii) in series.

   (b) Calculate the capacitive-reactance of the ***series*** combination in (a) when connected across a 50 Hertz supply.

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MORSEWORD 11

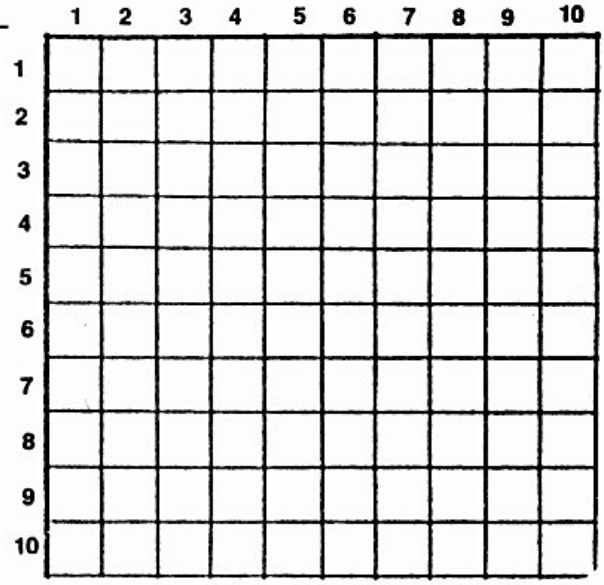
Compiled by Audrey Ryan
30 Starling Street, Montmorency, Vic. 3094

ACROSS

1 Regulates food intake
2 Type of gun
3 Meadows
4 Does
5 Silent actor
6 Desserts
7 Gives medicine to
8 Sound of a horn
9 Labels
10 Short sibling?

DOWN

1 Animal park
2 Exclamation of disgust
3 Futile
4 Listen
5 To cry
6 Emanation
7 Seizes
8 Heave
9 Floating slab
10 Bed linen



Club Corner

CENTRAL COAST AMATEUR RADIO CLUB FIELD DAY

— Preview

All amateur radio operators, their families, friends and those interested in amateur radio are invited to attend the 1988 Central Coast Amateur Radio Club Field Day. It will be held on Sunday, February 21, 1988, at the Gosford Showground. Gates will open at 8 am, wet or dry, as all displays are under cover.

REGISTRATIONS: Gents — $4. Ladies — $2. Children — $1. Pensioner concession of 50 percent on production of pensioner card will apply. A special group concession will also be available on application.

PROPOSED PROGRAM

Sunday, February 21, 1988

	0800 to 1300	Registration
	0800 to 1700	Tea and coffee available in Dining Room (no charge)
1	0800 to 0900	Open Mobile Scramble
	0930	Disposals Booking-in closes
2	1000	Pedestrian Talk-in Fox Hunt — two metres FM (146.500 MHz)
	1000	Disposals open (Entry northern end of Dwyer Pavilion)
	1000	Children's Events (races, etc) on grass near covered area
3	1045	Long Pedestrian Fox Hunt — two metres FM (146.550 MHz)
	1030	Quiz sheets available at Name-tags. Return to Name-tags before 1330
	1100	Entries close for Home-brew contest
4	1130	Mobile Talk-in Fox Hunt (a) — two metres FM (146.550 MHz) and (b) — 10 metres USB (28.360 MHz)
	1200	Lucky Registration Number drawing
5	1215	Open Pedestrian Fox Hunt — two metres AM (144.300 MHz)
	1215	Home-brew Antennas evaluation
	1230	Bus Tour departs
6	1300	Pedestrian Talk-in Fox Hunt — two metres FM (146.500 MHz)
	1530	Prize Presentation. Advise Information if leaving early to arrange delivery of prizes

Field Day attractions include:

Home-brew contest, Home-brew antennas evaluation (70 cm), Ladies and Gents quizzes, Ladies events, Children's events, Lucky door prizes, Disposals, QSL Bureau, Trade displays, Amateur television display, Packet radio display, Ladies stall, Complimentary tickets for bus tour and Reptile Park.

TRAINS: Sydney and Newcastle trains will be met by a courtesy bus which will run between Gosford Railway Station and the Showground between 8.30 am and 10.30 am.

PARKING: Plenty of off-street parking is available at the Showground.

ACCOMMODATION: Accommodation is usually scarce on the Central Coast at Field Day-time, and early booking is advised.

CATERING: Tea, coffee and biscuits available from 8 am to 5 pm at no charge in the Dining Room. Take-away food can also be purchased in the Showground.

DISPLAYS: Companies, persons, groups or clubs wishing to set-up a table or display at the Field Day should contact the Central Coast Amateur Radio Club at PO Box 238, Gosford, NSW. 2250. before January 31, 1988.

CALLS PRESENT: Bring your QSL cards for the "Calls Present" Board.

SCRAMBLE: The Open Scramble will be held between 8 am and 9 am. Rules as follows — no operation in Showground or one kilometre radius. No operation on Gosford repeaters. Log extract to the Event Recorder before 10 am showing time of contact, station worked, mode, band, and full serial numbers. Scoring one point per station per band regardless of mode. You may rework the same station on several bands.

HOME BREW CONTEST: Entries for the Home Brew Contest to be submitted by 11 am. Judging will take into account:

1. Innovativeness; 2. General Construction; 3. Overall Appearance and 4. Performance.

HOME BREW ANTENNA CONTEST: Bring along your 70 cm antenna for the Antenna Evaluation Contest. Antennas can be any 70 cm design.

1. Occupying no more than one-cubic metre; 2. With at least three metres of coaxial cable; 3. Fitted with a BNC connector and 4. A clamp for mounting onto a 45 mm mast.

DISPOSALS: Disposals forms and lot-numbers can be obtained in advance from Reg Brook VK2AI, PO Box 148, Gosford, NSW. 2250, or phone (043) 25 2191. Forms and lot-numbers are also available at the Showground on Saturday afternoon, February 20, 1988. All items for disposals must be booked in before 9.30 am, February 21, 1988. Late arrivals or equipment improperly tagged or catalogued may be refused.

Information on the Group Concessions, Trade Displays, Programs, and any other Field Day information can be obtained by writing to: Central Coast Amateur Radio Club, PO Box 238, Gosford, NSW. 2250.

—Contributed by Bren Connolly VK2BJC for the CCARC Field Day Committee

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16TH WORLD JAMBOREE MONDIAL

DECEMBER 30, 1987 – JANUARY 10, 1988

"Bringing the World Together"

AMATEUR RADIO STATION AX2SWJ 16th WORLD JAMBOREE CATARACT SCOUT PARK, NSW

Australia is the host country to the 16th World Jamboree to be held at Cataract Scout Park, south of Sydney, from December 30 to the January 10, 1988. This is the first time a World Jamboree has been held in the Southern Hemisphere and it will be the first official function of the Bicentenary Year, the opening ceremony taking place at 0001 on January 1, 1988.

Over 80 countries will be represented by their contingents at the Jamboree with a total attendance of more than 15 000 in a tent city, the Australian Contingent numbers 4 500.

One of the many activities at the Jamboree site is a fully equipped modern amateur radio station, courtesy of Dick Smith Electronics, manned by licensed operators within the scout movement and assisted by other amateurs who have freely volunteered their time for the duration of the Jamboree.

A very comprehensive static display of electronic and communication equipment together with a small lecture theatre will serve to introduce the hobby of amateur radio to those attending and visiting the Jamboree.

Contingents from overseas have been invited to arrange scheds with local amateurs prior to their departure to Australia and, conditions permitting, the Cataract Park station will endeavour to give our visitors a practical demonstration of amateur radio in action. A very attractive QSL card featuring the Jamboree Badge has been designed especially for the station.

—Contributed by E A Brien, Deputy Base Manager

BALLARAT HAMVENTION

The 1987 Annual Ballarat Hamvention, sponsored by the Ballarat Amateur Radio Club, was held in beautiful, but unusually warm weather for the period, which brought amateurs and their families from near and far.

The exhibitions, events and social gathering was complimented by the excellent food that was provided. All present, had an excellent time and have made it a 'must attend' weekend in their diaries for 1988. Meanwhile the committee has commenced planning a super Hamvention for Australia's Bicentennial year. If you missed out on the 1987 event, make it a must for this year.

—Photographs courtesy of Barry Wilton

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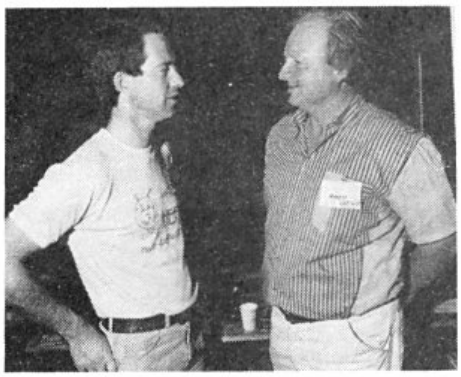
Brian VK3KQB, owner of WECAM, the well stocked local Icom Australia outlet, points out the salient points of a hand-held transceiver to Kevin VK3BPH.



Kenwood Retailer, Murray VK3CEI shows some of the extensive range available to Jim VK3KJH and Tom VK3TCE (extreme right).

Would the discussion be about Pounding Brass or WICEN? Popular AR columnist Gil VK3CQ, President of the North East Zone of the Victorian WIA Division captured on film, during a discussion with Andy VK3WH.

JANUARY CLEARANCE SALE!

ALINCO POWER SUPPLIES

EP-570 10V-15V DC Regulated 5.5A DC cont. 6.5A max — Was ~~$220~~ Now $159
EP-1510 10V-15V DC Reg 25A DC cont. 30A DC max 50% duty cycle. — Was ~~$299~~ Now $269
EP-2510 10V-15V DC Reg 25A DC cont. 30A DC max 50% duty cycle. — Was ~~$469~~ Now $299
EP-3030 10V-15V DC Reg 25A DC cont. 30A DC max 50% duty cycle. — Was ~~$549~~ Now $399

BLACK JAGUAR

BJ-200 HAND HELD SCANNER 26 MHz to 520 MHz — Was ~~$479~~ now $299

REGENCY

HX-1000 HAND HELD SCANNER 30 MHz to 512 MHz — Was ~~$449~~ Now $329

DAIWA PRODUCTS

CN-650 SWR METER 1.2-2.5 GHz. 2/20W FWD. 0.4/4W REF. N-type. — Was ~~$220~~ Now $150
CN-630M SWR METER 140-450 MHz. 50 ohm. 20/200W FWD. 4/40W REF. — was ~~$290~~ Now $190
CNW-419 TUNER 1.8-30 MHz Continuous. 17 Bands. 200W CW (3.5-30 MHz) 100W CW (1.8-3.4 MHz). — Was ~~$469~~ Now $299
CNW-518 TUNER 3.5-30 MHz. 8 Bands. 1kW CW. 50% duty cycle 20/200/1kW. — Was ~~$790~~ Now $499
PS-120 POWER SUPPLY 3-15V DC. 8A max. 12A max. — Was ~~$299~~ now $270
LA-2155H 2m LINEAR (144-148 MHz). Preamp gain 15 dB. Power Low 1.5W. High 25W. (In 25W — Out 150W) 13.8V. — Was ~~$559~~ Now $459
LA-4090 (430-450 MHz) Gain. 15 dB. In 10W — Out 85W. (In 25W — Out 90W) 13.8 V DC/25. — Was ~~$669~~ Now $529
VS-3 SCRAMBLER — Last One. — Was ~~$169~~ Now $99
LA-2035R (144-148 MHz) (In 1.5W Out 30W) — Was ~~$189~~ Now $129

PEARCE SIMPSON

T8-133 40ch UHF CB MOBILE. 5W Compact. — Was ~~$429~~ EXCELLENT VALUE! Now $250

TOKYO HY-POWER

HL-30U UHF 30W 430 MHz LINEAR AMP with GaAsFET receive preamp. FM, SSB, CW mode. — Was ~~$299~~ Now $199

HL-120U UHF 100W 430 MHz same specs as above. — Was ~~$829~~ Now $599
HL-85V 144 MHz ALL MODE LINEAR AMP — same specs as above (10-80W). — Was ~~$469~~ Now $390
HL-86V 50 MHz ALL MODE LINEAR AMP — same specs. (10-85W) — Was ~~$469~~ Now $390
HL-160V25 144 MHz ALL MODE (25W-150W). — Was ~~$669~~ Now $480
HL-725D 144 MHz/430 MHz COMBINED UNIT — same specs as above. — Was ~~$669~~ Now $499
HL-20U 430 MHz FM/SSB (2W-20W out). — Was ~~$199~~ Now $90

HAL

CT2200 TERMINAL. Receives & Transmits Baudot, ASCII, RTTY & Morse etc. Professional features — Was ~~$2000~~ Now $499
KB2100 KEYBOARD enable Split Screen Transmit & Receive. An excellent partner for CT2200. — Was ~~$599~~ Now $299

SANSEI

D-5000 SCRAMBLER, Digital, used for all mode Transceivers. Excell voice quality, high stability, etc. — Was ~~$4500~~ Now $3500

TAIYO

TD-L1626 DIRECTION FINDER, highly professional system complete with flat ant etc. — Was ~~$25,000~~ Now $17 000

GOODWILL

GDM-8035 DIGITAL MULTIMETER bench type. — Reduced below cost $99 only.

TELEREADER

CD-670E DIGITAL DECODER — for CW (Morse code), Baudot, ASCII & TOR/AMTOR, RTTY, etc. — Was ~~$629~~ Now $399

TONO

THETA-777 DECODER for AMTOR, RTTY & CW and has complete software for Communication Rx/Tx etc. — Was ~~$729~~ Now $499

TASCO

FX550 COMPUTER CONTROLLED VIDEO FACSIMILE PROCESSING SYSTEM — Latest Technology. — Was ~~$899~~ Now $799

DRESSLER

RPA-70 GaAsFET Rx PREAMP. 70cm — Was ~~$109~~ Now $49
VV INTERFACE REMOTE UNIT for power supply & switching of M/Mounted preamps via Coax Feeder — Was ~~$69~~ Now $20
EVV700 M/Mounted PREAMPS 70cm Low Noise — Was ~~$299~~ now $279
EVV2000 M/Mounted PREAMPS 144 MHz Low Noise — Was ~~$299~~ now $279

DATONG

SRB-2 AUTO NOISE BLANKER — Blanks noise from any Receiver or Transceiver — Was ~~$299~~ Now $95
DF + DFAI DIRECTION FINDING SYSTEM for existing narrow band FM Receivers & Transc. — Was ~~$599~~ Now $350
ANF AUTO NOTCH FILTER. 3 Filters in one incl CW. Var Low Pass. Var High Pass & Notch. — Was ~~$239~~ Now $139
VLF Adds Low Frequency coverage to exist. Communication Receivers — Was ~~$129~~ Now $99
RFA Improves sensitivity & Signal to Noise Ratio of Receivers & Transceivers 5-200 MHz — Was ~~$149~~ Now $129

WELZ

SP-600 SWR & P/METER 1.6 to 500 MHz. Has 3 built-in sensors. 20W/200W/2000W Range. — Was ~~$389~~ Now $349
SP-225 SWR & P/METER 1.8 to 200 MHz. Has 1 built-in sensor. Range 1W/3W/30W. — Was ~~$249~~ Now $229
SP-425 SWR & P/METER 140-525 MHz. Has 1 built-in sensor. Range 1W/3W/ 30W. — Was ~~$259~~ Now $240
RS-3000 POWER SUPPLY 13.8V dual outputs 30A/10A. 50% duty cycle. Ripple 0.2 mV. — Was ~~$480~~ Now $340
RS-3050 POWER SUPPLY 3V to 15V dual outputs 30A/10A. 50% duty cycle,etc — Was ~~$599~~ Now $450

ANTENNAE

CREATE 2X713 (430 MHz) 2 x 13 element Yagis compl W/Phasing Harness. — Was ~~$349~~ Now $199
CREATE X211 (144 MHz) 11 element Yagi. — Was ~~$299~~
CREATE 2X211 (144 MHz) 2 x 11 elem Yagis compl with Phasing Harness. — Was ~~$425~~ Now $359

TET

TE-11F3J 3 el. 27 MHz Base Beam Antenna — Was ~~$159~~ Now $129
HB 23M 2 el 3 band (20, 15, 10) Beam — Was ~~$369~~ Now $299

CHIRNSIDE

CA-33 3 el Triband Beam (20, 15, 10) — Was ~~$429~~ Now $359
CA-35DX 5 el Triband Beam (20, 15, 10) — Was ~~$529~~ Now $459
CONNECTORS GALORE . . . 2 pin, 3 pin, & 4 pin — @ $1 each

CUSTOMERS NOTE:

We are now taking bookings for buses from Melbourne & Brisbane for the Gosford Hamvention. Ring now & book.

CORRESPONDENCE: BOX K21, HAYMARKET, NSW. 2000

EMTRONICS

MAIL ORDERS WELCOME

NSW & HEAD OFFICE:
92-94 Wentworth Ave, Sydney
NSW. 2000. TLX:AA73990
P.O. Box K21 Haymarket, NSW. 2000.
Ph: (02) 211 0988
FAX: (02) 281 1508

VICTORIA:
288-294 Queen St, Melbourne
Vic. 3000.
(Entrance from Lt. Lonsdale St.)
Ph: (03) 670 8551 or 670 0330
FAX: (03) 670 0671

QUEENSLAND:
416 Logan Road, Stones Corner
Qld. 4120. TLX:144696
Ph: (07) 394 2555
FAX: (07) 39 4316

VK2 Mini-Bulletin

Tim Mills VK2ZTM
VK2 MINI BULLETIN EDITOR
Box 1066, Parramatta, NSW. 2150

A happy New Year to all members from the Council and Office Bearers of the NSW Division. Hopefully it will be a year of good DX and other amateur radio activities.

Within VK2 there will be a range of activities in association with the Bicentenary. The most important for VK2 is the introduction from the start of the year (one minute past midnight on January 1), of the previously advised *Awards*. Full details and requirements of the awards will be in the next issue of *Amateur Radio*.

The major award will be the VK2 Division's *Bicentenary of Australia Award 1788-1988*. To achieve this award you need to work 200 different stations within the VK2 call area. Overseas amateurs will be seeking this award, as well, so try and be active whenever band conditions permit. Other awards being introduced at the same time include the VK2 Award, National Parks and Historic Places Award, and a Worked VK2 Shires Award. Log entries must be kept for all contacts used to claim these awards. Any contact from the start of 1988 is valid. If you require further details, listen to the broadcasts or a sheet is available from the Divisional Office for collection, or send a SASE to PO Box 1066, Parramatta, NSW. 2150. The Awards Manager is Col VK2CS.

For the duration of January 26, 1988, the Division will be mounting a special event station on all available bands, most likely under the call of VI88NSW. A special QSL will be available on bureau exchange.

Another change in 1988 will be with the VK2WI Sunday Morning and Evening Broadcast transmissions. From the re-commencement of the sessions for the new year, on January 10, there will be a slight change to the starting times. The news content will remain with a start at 10.45 am and 7.15 pm, for a trial period with a technical and educational segment. A reminder that if you are unable to catch either of the broadcast sessions that the highlights for the week may be obtained from the answering machine on (02) 651 1489.

Members are reminded that it is approaching that time to start thinking about Annual General Meetings and Council elections. The nominations for council will become due during February and the AGM will be in April. Nomination forms for council are available from the office.

The Two-Metre Simplex Contest, held over September 25, 1987, was a big success. Over 100 stations took part with a return of 43 logs. The major places were:
First Overall — VK2BIT with 2714 points
Second — VK2DLE with 2193
Third — VK2KAA with 2132.

In the country section, the highest score was VK2XGM at Byron Bay with 90. Next was VK2AMV at Forbes with 72, followed by VK2GJ at Brunswick Heads with 20.

There were many comments included with the logs and it looks like it will be practical to conduct a series of short duration contests at regular intervals. A two-metre SSB one was held on November 27.

About the time this issue of AR reaches you the Ross Hull Contest will be in progress. It needs your support and a returned log.

The Divisional Office will close during the holiday period and re-open early in January.

The office has a few 1988 calendars available. The cost was unknown as these notes were being prepared, but a phone call on (02) 689 2417 (11 am to 2 pm) or via the broadcasts will get it to you.

There have been several changes recently to repeater channels in an attempt to overcome some of the associated pager problems. The Mittagong VK2RHR 7350 and Goulburn VK2RGN 7325 have, by this time, received several Telecom channels on their respective sites as part of the expansion of paging facilities.

Goulburn will be changing to Channel 6825. Changes for Mittagong are still to be determined as the region is also in a television Channel 5A service area. It will also be difficult to obtain alternative channels for this site as there is a heavy concentration of services at the site. It is an intermodulation nightmare.

VK2ROT 7075 Paddington will change to 7025 to get away from an intermodulation problem on the 7075 input. VK2RTZ 7100 Newcastle went to 6775. VK2RLD 7375 Liverpool went to 6625. 7100 is to become VK2RZL in the Upper Hunter. VK2RPI ex-6625 Newcastle RTTY has been cancelled. VK2RTD 6800 is now operational from Tumut. VK2RWM 7100 Grenfell is to have a UHF service added.

The problems that come from the adjacent pager band is making life difficult for some repeaters. In VK2 there has been plenty of use made of channels above 147 MHz. Most of these are within, or adjacent to, the Sydney region. While some systems have moved to channels below 147, it is not possible in the majority of cases as there are neither the channels available, nor should the Amateur Service leave the top Megahertz.

Perhaps it would benefit the majority of repeater operators to alter the existing policy and reverse the input — output frequencies above 147 MHz. This would place each repeater input an extra 600 kHz from the pager band. It is a matter for all amateurs to consider. By now, all VK2 repeater groups should have received a report on this approach. If you have any thoughts on the matter you may obtain a copy of the report from the Divisional Office as we would like to hear your opinion.

The Central Coast ARC Field Day will be held at the Gosford Showground on Sunday, February 21, 1988.

NEW MEMBERS

A warm welcome is extended to the following who were in the November intake.

D Downie VK2EZD	Sylvania
R N Fullerton Assoc	Mount Victoria
K Goodwin (Mrs) Assoc	Auburn
D M Hughes VK2DML	Turramurra
D S Mackie VK2XGX	Cromer
R J Paxley Assoc	Armidale
J Ronk VK2FIX	Lane Cove
P A Smith VK2FJB	Singleton
G J Stephenson VK2VGS	Cronulla
S D G Tucker VK2ZET	Elanora Heights
A P Wilson Assoc	Yagoona

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VK4 WIA Notes

Bud Pounsett VK4QY
Box 638, GPO, Brisbane, Qld. 4001

STORMNET

The south-east corner of Queensland is subjected to many violent storms every summer. The stormy season begins in October and can stretch right through until May. Many are accompanied by high winds and hail.

For several years a somewhat informal net has been activated on the Brisbane two metre repeater, VK4RBN. The net controller was usually Fred Saunders VK4FJ (until recently, VK4AFJ). Reports were received from amateurs as to the progress of the storm. This enabled those listening to take such precautions as were needed at the time.

This year more organisation has gone into the net. It has come under the umbrella of the Brisbane-area WICEN Group. Fred VK4FJ, was appointed net controller, and Manfred VK4KHW, as his deputy.

Publicity has been given to this service by the Sunday morning Divisional Broadcast which has detailed simple operation procedures. Already the storm watch has been activated and amateurs have conducted themselves very well. It is not confined to members of WICEN, of course, any amateurs with storm information are invited to report in.

It is very pleasing to the WICEN group that the Brisbane headquarters of the State Emergency Service monitor the Brisbane repeater and take note of the reports to the net controller.

The Brisbane Stormnet is tangible evidence of how amateur radio can be of service to the community.

THE SOUTH-EAST QUEENSLAND TELETYPE GROUP WORLD-WIDE NEWS SERVICE

The VK4TTY news printed each Monday evening on two metres and 3.630 and 7.045 MHz, has been reaching much further afield than the Group's news editor, Rob Green VK4KUG, ever envisaged.

Thanks to packet radio, the Monday night newscast now goes to many bulletin boards, not just in Australia, but to New Zealand, the United States, Canada and the Far East. The Group have already had messages of appreciation and recommendations on the quality of the news.

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QRM from VK7!

John Rogers VK7JK
VK7 BROADCAST OFFICER
1 Darville Court, Blackman's Bay, Hobart, Tas. 7052

The WICEN groups in several areas of the State seem to be having quite regular commitments to provide communications support for such activities as car rallies, orienteering expeditions and ocean yacht racing (like the Westcoaster). The experience gained from these activities, according to their various co-ordinators, will stand them in good stead if they are called upon to act in the case of an actual disaster.

Due to a long lead time, this has had to be written before the Westcoaster (the Melbourne to Hobart Yacht Race) takes place, and a more complete report on the outcome of the efforts of amateur operators will be given in the February AR.

A regular "training talk" has been transmitted each week on the VK7WI Divisional Broadcast. WIA Broadcasts are becoming slightly more complex in the State as further relay frequencies come into play, and the broadcast roster now includes a total of 28 participants. This means that each involved amateur is concerned with originating, relaying on 80 or 40 metres only two or three times in the three-monthly period.

The 80 metre antenna at the Southern Activity Centre is now "up and running" and this means that the Centre can accept its share of 80 metre relays as well as originating two metres. The broadcast is being recorded and repeated now on Tuesday evenings, 1930 hours local, on 80 metres only (3.590 MHz) taking up the half hour before the Devil Net. We hope that those who listen to this report will stay on air and join in the Devil Net under the benevolent guidance of Bob VK7NBF, who is in his fifth year as Devil Net Co-ordinator.

The two metre repeater on Mount Wellington, which has been the object of a great deal of "repair and maintenance" work during the past two months, is now working very well. Reports of access to the repeater have been received from many areas of the State which would earlier have seemed impossible, or at least very difficult and spasmodic. The linking of repeaters for broadcast purposes has been faultless and has made re-broadcasting and relaying very reliable. The meteorological conditions at the 4000 feet-plus level play havoc with all external fittings, especially cables, and the group who spend time working under such conditions to keep the repeater working deserve the thanks of all repeater users.

WIA MEETINGS

WIA meetings are held at:

Penguin High School on the second Tuesday in the month at 8 pm.

Launceston Maritime College on the second Friday, at 7.30 pm.

Hobart Activities Centre, Newtown Road on the first Wednesday at 8.15 pm.

Visitors to Tasmania are very welcome to any of these meetings and can always be "talked in" on one of the repeaters. As well as the general business agenda, there is often a guest speaker or a debate at these meetings which would be of interest to inter-state visitors. Recently, there have been, for instance, talks on Satellite Communications, Cellular Telephone Systems, Safety in the Shack and Patching Units for Broadcast Relays. Debates have been on Morse and the Amateur Examinations and the Use of Repeaters.

The discussion on "Morse and the Amateur Examinations" brought out several interesting points:

1. That if the use of Morse code became extinct in the amateur fraternity (as seemed likely to many of the speakers if the proposed changes are made), we could no longer call ourselves a truly international body. We would have cut ourselves off from communication with amateurs in many (third world?) countries who were forced to home-brew their own gear and be restricted to low power.
2. Otherwise, do we expect all other participants in radio communication also to allow Morse to disappear? Many will not, and how do we then communicate with them?
3. Many of the QRP groups in the amateur world would shrink onto small "islands" of communicators quite apart, distinct from the rest of the fraternity — QRP is the mode of entry for many, especially young people, into the hobby.

The ATV Group is continuing to meet regularly in the north-west of the island under the guidance of Peter VK7AX, and to give encouragement to other prospective ATVers, there is a transmitter kit available from Peter.

A definite move to support would be novice amateur operators has been set in train by Noel VK7EG, and the branches are distributing information packages to colleges and schools to attempt to increase the number of candidates for the courses and to provide personal help when required.

The Tasmania Day Award proved to be a going concern and, already discussions are taking place about the possibility of a repeat in 1988.

Talking of awards, the 400th Tasmanian Devil Award was reached a short time ago. VK3CWJ was the lucky recipient, not only of the award certificate itself, but also a signed photograph of the Tasmanian Devil Net Organiser himself!

HELP NEEDED

The Max Loveless Pioneer Memorial Collection needs some help to get a 1960s vintage home-brew CW transmitter back on the air. Required is a valve or valves, type QV08 — 100 used to be used in a DCA transmitter type T49, and also in superior public address equipment.

If you can help with either a donation of same or a sale, please contact VK7RS, or anyone connected with the Tasmanian Division of the WIA. We would like to get this particular transmitter on the air again in 1988.

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VK3 WIA Notes

FEDERAL CONVENTION

The VK3 Divisional Council is most interested to hear from individuals, groups and clubs who have matters which they feel should be discussed at the next Federal Convention.

VICTORIAN DIVISION BOOK OFFICER

At the October meeting of the Victorian Divisional Council, Fred Swainston VK3DAC, was appointed to the position of Book Officer. Fred, who used to work as an electronics technician, is a full-time TAFE instructor and has been a successful and hard-working AOCP Instructor for many years. Council is confident that Fred will, through the bookshop, be able to supply a range of valuable reference works appropriate to the needs of operators of all levels.

HIGH ALTITUDE PIRACY

The Victorian Divisional Council has written to the DOTC expressing concern re the illegal use of frequencies in the 144 MHz band during the World Hang Gliding Championships to be contested in central Victoria this month.

Illegal use of frequencies by competitors at previous events, especially during bushfire season, could have interfered with WICEN emergency service operations. Whilst the illegal operation of two metres equipment mainly concerns hand-held units, the fact that these units are operated at altitudes up to 3000 metres, or so, provides extremely long range interference.

A letter was written to the President of the Australian Hang Gliding Federation requesting their co-operation, however, this body appears to be very reticent to co-operate and has adopted the attitude that communications on illegal frequencies are a matter for DOTC. They have indicated that they are not prepared to modify their rules and penalise contestants who operate in the 144 MHz band.

The World Hang Gliding Championships are being sponsored by a large brewing company.

NEW SERVICES AVAILABLE

The VK3 Division has high quality RG213 Belden cable available to members at $2.50 per metre.

The Division also has negotiated with a printer for the printing of quality two-colour QSL cards at a reasonable price to members.

Inquiries regarding the cable should be directed to the Divisional Office, 412 Brunswick Street, Fitzroy.

For further information on the QSL cards, please contact the State President, VK3XV, QTHR.

This is a membership service operated by the VK3 Division on a non-profit basis.

—Bill Trigg VK3PTW, VK3 Council.

NEW MEMBERS

A warm welcome is extended to the following new members.

R D Fincher VK3BRF, Red Hill
Steven Jackson VK3KRG, West Footscray
J A Maker, Dandenong
D B Milne, Airey's Inlet
A J C Randall VK3MAT, Ringwood
A W Rowe VK3PMF, Mill Park
A J Williams VK3MAW, Forest Hill
A S Meynderts, Wendouree
Donald Peters VK3DVE, Tallangatta
Geoffery Rees, Lara
P J Shufflebotham VK3XJI, Romsey
Peter Styles VK3EBP, East Kew
N Webster VK3KAL, Alexandra
Michael Weinstock VK3EMJ, Ripponlea
Colin Dyason, Drouin

ar

Five-Eighth Wave

Jennifer Warrington VK5ANW
59 Albert Street, Clarence Gardens, SA. 5039

WIND-DOWN JUBILEE 150 — SA

Almost 12 months to the day, the Grand Old Lady, VK5JSA, went skywards from South Australia, signalling the commencement of South Australia's amateurs involvement in the State's 150 birthday celebrations. In the months that followed, the call sign literally "popped up" from the length and breadth of the State. It travelled by air, sea and rail many times over, as well as from the United States and within Japan. It lit up many transceivers around Australia and overseas in a year of poor propagation and, with it, brought friendships and the good things of amateur radio.

A LETTER OF THANKS TO ALL

The success of the program can be measured in its overall results, its goodwill to the hobby, its promotional aspects towards the State and, very importantly, its reliance on firm financial backing and resources to achieve a noble end and come out in front — and have some fun doing it.

All aims and objectives were fulfilled and, thanks to our sponsors and you out there, the many thousands of contacts and award chasers, all creditors were appeased and the blue ink surpassed. The SA Division and the amateurs who worked for this very successful outcome would like to share the following letter of thanks forwarded recently to the Premier of South Australia, the Honorable John Bannon, with the amateurs of Australian and beyond.

Dear Sir,

On behalf of the WIA (SA Division) I would like to thank you, Sir, for your support of our major Jubilee 150 program of amateur radio activities and in particular the addition of your personal signature to in excess of 1500 SA Jubilee Certificate Awards.

The SA Division believes its program to make world contacts and to promote SA was an outstanding success. Amateur radio contacts communicated SA's birthday celebrations and reached into all parts of the world by many different modes including satellite, Morse code, RTTY and AMTOR with by far being SSB (voice) on HF bands.

Sir, I feel you would be interested in a brief of the results achieved and the scoreboard would read as follows:

There were

- 90 000 radio contacts, 90 000 special J150 QSL cards forwarded to in excess of 150 countries.
- 1450 special "Premier" signed SA Awards (to achieve the award several contacts were required with SA stations and activities to qualify for the award).
- a total of 80 different countries plus SWLs received the J150 award (a list of these countries have been enclosed).

During 1985-6 from a total of 25 listed activities, five additional awards complimented the J150 Award and were included under the umbrella of the J150 program. Activities were followed up with award applications for:

- Kangaroo Island, Cape Willoughby Lighthouse (400 awards).
- Jubilee Industry Trade Train (state-wide) SA (530 awards).
- Paddle-steamer Industry, Renmark SA (250 awards).
- Marion Council Centenary J150 (250 awards).
- Australian Formula 1 Grand Prix, Adelaide (400 awards).

It should be noted that the awards forwarded represents about 20 percent of the total contacts made for each activity.

A feature of our program was to experiment with antennas and therefore celebrate with the use of the special call sign VK5JSA or VI5JSA from as many locations as possible.

In addition to working from a lighthouse on Kangaroo Island, the Paddle-steamer at Renmark, the Trade Train (state-wide), the Marion Council Library and the metropolitan and near-country for the Grand Prix, the call sign travelled rail mobile on the Trans-Australian to Perth and return, on the Failie (marine mobile) and by air (aeronautical mobile). It was located as far north as the Moomba Gas Fields (courtesy of Santos Ltd) and overseas in Japan and the USA (Texas and California) with 1250 logged contacts within the States. Unfortunately, hot air balloons and submarine operations alluded our theme of *Have J150 Call Sign, Will Travel.*

Feature articles appeared in Australian and overseas radio magazines, namely *Amateur Radio* (the official WIA monthly magazine), *Amateur Radio Action*, *CQ Ham Radio* and *73 magazine*, American and Japanese periodicals.

The WIA (SA Division) would ask me to acknowledge, Sir, the formal acceptance of our program by Mr Gavin Keneally then the Honorable Minister for Tourism, and the sponsorship afforded our undertaking by the SA Tourist Bureau through the work of Mr Chris Crayford, Marketing Manager, and Mr Bob Bullfield.

Again, Sir, on behalf of the SA Division of the WIA, the President, Mrs Jennifer Warrington, the Council and the amateurs of SA, we thank you. It was a pleasure to help put SA on the world map, we enjoyed doing it by promoting VK (Australia), 5 (SA), JSA (Jubilee SA) via the hobby of amateur radio.

The SA Division also extends acknowledgments of supportive sponsorship for SA's major awards program to:

- Hills Industries SA Ltd, (Mr R W Dodman and Mr R D H Ling)
- The District Council of Kingscote (Mr Neville Cordes) and the Jubilee 150 Committee of Kangaroo Island (Mr George Murphy)
- AN Rail, (SA) and Westrail (WA)
- ANZ Bank (Mr Bruce Dent)
- AXIS Travel of Tranmere, SA (Mr Max Najar and staff)
- Coco Cola SA (Mr Vince Monerola)
- Jubilee 150 Committee (Mr John Chapman)

Your generous support has been well received throughout Australia and overseas, thank you.

Yours sincerely,
(Signed:) Graham Horlin-Smith VK5AQZ
Co-ordinator, WIA (SA Division) —J150

COUNTRIES AND CALL SIGN OF FIRST CONTACT

1	Australia (VK5SJ)	42	Nepal (9N1MC)
2	New Zealand (ZL1AQO)	43	Austria (OE1PCC)
3	Papua New Guinea (P29JW)	44	Sweden (HB9AIB/SM)
4	Japan (JQ1EBK)	45	India (VU2VVC)
5	USA (K7KSA)	46	China (BY1QH)
6	Malaysia (9M2DF)	47	East Germany (Y36TG)
7	Fiji (3D2DW)	48	Sri Lanka (4S7EA)
8	SWL — Australia (VK3XKG)	49	Costa Rica (TI2JJP)
9	South Africa (ZS1FW)	50	Saudi Arabia (HZ16260)
10	Brunei (V85WS)	51	Hong Kong (V560A)
11	Mexico (XE1JIX)	52	Kuwait (9K2YA)
12	Indonesia (YB3CKY)	53	Heard Island (VK0DA)
13	Bolivia (CP5LE)	54	Cyprus (ZC4NL)
14	Brazil (PY2ZJ)	55	Antarctica (VK0TW/S)
15	Chile (CE1FGT)	56	Gabon (TR8CA)
16	Canada (VE4ANA)	57	Togo (5V7SA)
17	Argentina (LU1CIZ)	58	Guam (AH2F)
18	Trinidad (9Y4MJK)	59	Oman (A4XKJ)
19	Alaska (KB6GOZ/MM/KL7)	60	Sicily (IT9TQH)
20	St Kitts, WI (V44KQ)	61	Azores (CU3AA)
21	Wake Island (NH6FU/KH9)	62	Canary Islands (EA8ALY)
22	England (G4VOE)	63	Solomon Island (H44JL)
23	Switzerland (HB9VQ)	64	Hungary (HA6NF)
24	Germany (DL2RBK)	65	East Malaysia (9M6MO)
25	Wales (6W4VBV)	66	Ecuador (HC1RF)
26	Scotland (GM0FQV)	67	USSR (SWL — UA1.169738)
27	Czechoslovakia (OK2BBI)	68	Gambia (Africa) (C53BU)
28	Western Samoa (5W1FT)	69	Marshall Islands (KX6BF)
29	Malta (9H4E)	70	Poland (SP8AJK)
30	Denmark (OZ1LDN)	71	Kenya (5Z4BP)
31	Israel (4Z4OX)	72	Singapore (9V1WR)
32	Netherlands (PA3CWJ)	73	Ukraine (RB5DX)
33	Noumea (FK8AH)	74	Korea (HL2ADV)
34	Spain (EA2TSA)	75	Grand Cayman (ZF1RC)
35	Pakistan (AP2SQ)	76	Nauru (C21RK)
36	Ireland (EI6EW)	77	Yugoslavia (YU3HR)
37	Italy (IK5FCD)	78	Philippines (W3WYP/DU2)
38	France (F6IFE)	79	European USSR (UW3IN)
39	Peru (OA6DA)	80	Estonia (UR2DL)
40	Rumania (YO4JQ)		
41	Belgium (ON6HR)		

WIND UP? ? ?

Well, that's it for 1986 and a curtain call and close for VI5JSA and here we are on the doorstep of the 1988 Bicentenary with a few activities on the drawing board for VK5-land, or should we say, VI88SA? Keep an eye out for us on the Murray Princess (marine mobile), the Grand Prix later in the year with a couple of activities in between hopefully! Thanks to the SA gang and Seasons Greetings to all.

—Correspondent for the month:
Graham Horlin-Smith VK5AQZ
2 Athol Drive,
Tranmere, SA. 5073.
ar

Ionospheric Summary

The monthly average of the 10 cm flux for September was 86.5, for sunspots the number is 33.5, the A index 16.4, I index 21.1, solar activity was low and there was one M class flare observed on September 21.

Between September 5 and 10, there appeared to be a good chance of energetic flares and associated shortwave fade-outs, but none eventuated. Solar activity also appeared likely to increase during the period around September 21, but only the one energetic flare was observed.

The high monthly sunspot number for September continues the trend of recent months and brings the yearly smoothed value for March 1987 up to 21.9.

Geomagnetic disturbances were recorded on September 1, 2, 10-16, 22-26, and 28-30. September was a very disturbed month with two extended periods of disturbance. The most disturbed days were September 11 and 25, when the A index exceeded 30 — 40 on the 11th and 35 on the 25th. The monthly averaged A index was the highest recorded since February 1986. Aside from that month, September was the most disturbed month since November 1984.

IPS have now produced a Frequency Prediction Calculator for mobile communicators. It provides an economical and easy to use method to instantly select a frequency for HF communication needs. The path covered can be up to 1000 kilometres. The price for a quantity of 1 to 9 is $14.50 each and includes four insert cards, one for each season. The calculator is a four page folder with a multi-page sliding insert card, updated every three months.

Those interested should contact IPS Calculator, IPS Radio and Space Services, PO Box 702, Darlinghurst, NSW. 2010, or telephone (02) 269 8616.

This calculator could be helpful to those who have a daily sched with other VKs or possibly Pacific areas.

Should clubs require some, there is a reduction in price to $13.00 for 10 to 49 copies. Postage is included for all purchases.

Contributed by VK2QL

Magazine Review

Roy Hartkopf VK3AOH
34 Toolangi Road, Alphington, Vic. 3087

G — General
C — Constructional
P — Practical without detailed constructional information
T — Theoretical
N — Of particular interest to the Novice
X — Computer program

BREAK IN, October 1987. Hawles Bay VHF Group issue (G). Spectrum Deregulation (G & N).

CQ-TV No 139, August 1987. Information and circuits for ATV. (British Amateur Television Club) (G).

73 MAGAZINE, September 1987. Special Antenna issue. (G & N).

QST, September 1987. Alternative Energy (G). Precise Tuning Frequency Indicator (P). Tuning Diodes (C & N). Fibre Optics (G & N).

RADIO COMMUNICATION, October 1987. Invisible Antenna for 14 MHz (P).

CQ, September 1987. 1986 CQ WW DX Phone Contest results (G).

ar

Over to You!

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publisher.

JOTA RELAY

I feel it would be most remiss if all amateurs in this State did not write to the magazine and express their grateful thanks to whoever arranged the "hook-up" between here and the east on two metres for the JOTA exercise weekend.

If little else, these amateurs should be publicised in AR so that all will know to whom we can say "Well Done".

An article on how it was done will no doubt appear in due course and will be appreciated by all who made use of the facility.

Apart from the astounding event, mention must be made of the extreme courtesy shown by the many gentlemen during the resulting "dog pile" on some occasions, and their patience in waiting for those by nature a little slow with their overs. As well, it was noticeable that amateurs were quick to ask others to take a turn so that there was little "hogging" of the facility.

I am of course reporting from this side of the continent and maybe it was different elsewhere. May the spirit of amateur radio as such long continue in our hobby making us better for it. Also "Well Done" to the net operators, whose excellent supervision kept things functioning smoothly.

73 to all

R A Davey VK6ARD
12 Lillian Street,
Cottesloe, WA 6011
ar

* * *

TECHNICAL CORRESPONDENCE

I read with interest the letter of Allan Doble VK3AMD, in the August 1987 edition of the magazine's regular feature *Over to You!*

Allan indicated that there was very critical tuning of Emtronic's antenna tuning unit. The problem is not unique to this brand of tuner, but also affected my new Kenwood AT230 tuner.

I improved adjustability by installing a 6:1 reduction drive to the "R-TUNE" control. The other control "X-TUNE" did not require similar modification.

Actually, this modification was not difficult, but took me several hours to experiment with, and finally install the reduction drive. Conveniently, the existing parts of the knob were used and the external appearance of the unit is not changed.

Internally the insulating shaft of the capacitor of the "R-TUNE" control was shortened by about 1.5 cm. The hole in the front panel was enlarged and two holes drilled for use with 1.5 cm spacers and long screws to rigidly mount the reduction drive mechanism. Two small screws (metric thread) were used to fix the metal part of the original knob to the drive to act as an indicator, while the plastic part is used as the hand control. It appears that the use of a reduction drive may have been in the original design but was not in the final product.

I have found that on the 80 metre band of the Hy-Gain 18AVT vertical aerial the tuner is now much easier to use. The 6:1 ratio is an ideal reduction, and is readily available.

I find that the tuner degrades the SWR of reasonably resonant aerials irrespective of any settings of the controls. Also, I find it impossible to obtain SWR better than 3:1 on 80 metres with the 18AVT. Is this a normal feature or unique to the design of the Kenwood unit? I would appreciate comments from other users.

Yours sincerely,

Richard Penalurick VK1KAB
HMAS *Nirimba*
Quakers Hill, NSW. 2764
ar

* * *

TOPICAL TECHNICALITIES

Topical Technicalities has started badly. No 1 was intended to show that the most important purpose of impedance matching is to obtain maximum conversion efficiency and not the maximum possible transfer from source to load. The errors in the text will add to the confusion about this subject. They are in order of appearance:

Replace

$$R_s \pm jX_s = R_l \pm X_l$$

with

$$Z_{source} = R + jX$$

and

$$Z_{load} = R - jX$$

Note: Steve VK3HK, has pointed to possible confusion caused by the word 'conjugate'. Conjugate is used in mathematics when expressions are joined by a reciprocal relationship. +j is the reciprocal of -j; (their product is unity) therefore R + jX is the conjugate of R — jX.

The DC resistance should be 12/9.7 = 1.24 ohms.

The RF resistance is E_p^2/PEP = 0.79 ohms.

My typewriter doesn't have a symbol for Pi and I used ¶ which was also used by the typesetter. I hope readers guessed correctly.

Yours sincerely,

Lindsay Lawless VK3ANJ
Box 112,
Lakes Entrance, Vic. 3909.
ar

MORSEWORD 11 SOLUTION

Across: 1 diets 2 bren 3 leas 4 acts 5 mimer 6 tarts 7 dose 8 beep 9 tabs 10 bro

Down: 1 zoo 2 ugh 3 vain 4 hear 5 sob 6 aura 7 takes 8 heft 9 raft 10 sheet

	1	2	3	4	5	6	7	8	9	10
1	—	•	•	•	•	•	—	•	•	•
2	—	•	•	•	•	—	•	•	—	•
3	•	—	•	•	•	•	—	•	•	•
4	•	—	—	•	—	•	—	•	•	•
5	—	—	•	•	—	—	•	•	—	•
6	—	•	—	•	—	•	—	•	•	•
7	—	•	•	—	—	—	•	•	•	•
8	—	•	•	•	•	•	•	—	—	•
9	—	•	—	—	•	•	•	•	•	•
10	—	•	•	•	•	—	•	—	—	—

Obituary

HAROLD DICKS VK6QD

When a capable and determined person is convinced early in life that his career should include specialist training and skills, nothing can prevent him from achieving his goal. Add to this the mental attitude that performance of a standard less than excellent is not acceptable and you have a fair understanding of the character and ability of the late Harold Dicks, who died suddenly at his home in Perth on October 10, 1987.

In the 1930s, when Harold was a medical student in Sydney, the other facet of his magnificent obsession became a reality, he learned to fly. At that time there were not very many pilots in Australia and the country was trying to recover from the great financial depression. This did not deter him, and it was typical of his outlook that he also studied for, and obtained, his aircraft Ground Engineers Certificate.

His first medical appointment in Cairns did not hold him for long, after he saw an advertisement for a Government Medical Officer at Marble Bar. It stated that the applicant must be prepared to fly.

It became a natural progression for him to the Australian Aerial Medical Service. Wonderful things happened during those years when the AAMS became known as the Royal Flying Doctor Service and John Flynn's vision of a 'mantle of safety' for the people of the outback became reality.

Many stories have been told, but there was so much in the life of Harold that it is doubtful whether it will all become known. It is certain that there are many thousands of men, women and children who will mourn the loss, and be grateful for the inspiration and work of this truly remarkable man.

Harold was well-known in the Port Fairy district of Victoria, as he frequently called at Warrnambool on the many occasions when he ferried new aircraft from overseas en route to Perth for service with the RFDS.

In addition to the kindred spirits in aviation, he was also in regular contact with his amateur radio friends. He will be sadly missed. We honour his memory and join with his widow, Patricia VK6QL, and his children, Robin and David, to mourn his loss.

Vale VK6QD.

—Printed courtesy of the *Port Fairy Gazette*, written by George Bills-Thompson VK3AHN, and contributed by

DEADLINE

All copy for inclusion in the **March 1988** issue of *Amateur Radio*, including regular columns and Hamads, must arrive at **PO Box 300, Caulfield South, Vic. 3162,** at the latest, by **9 am, January 19, 1988.**

Hamads

PLEASE NOTE: If you are advertising items FOR SALE and WANTED please write ***each*** on a separate sheet of paper, and include all details; eg Name, Address, Telephone Number, on both sheets. Please write copy for your Hamad as clearly as possible. ***Please do not use scraps of paper.***

- Please remember your STD code with telephone numbers
- Eight lines free to all WIA members. $9.00 per 10 words minimum for non-members
- Copy in typescript, or block letters — double-spaced to ***Box 300, Caulfield South, Vic. 3162***
- Repeats may be charged at full rates
- QTHR means address is correct as set out in the WIA current Call Book

Ordinary Hamads submitted from members who are deemed to be in the general electronics retail and wholesale distributive trades should be certified as referring only to private articles not being re-sold for merchandising purposes.

Conditions for commercial advertising are as follows:

$22.50 for four lines, plus $2.00 per line (or part thereof)

Minimum charge — $22.50 pre-payable

Copy is required by the Deadline as indicated on page 1 of each issue.

TRADE ADS

AMIDON FERROMAGNETIC CORES: Large range for all receiver and Transmitting Applications. For data and price list send 105 x 220 mm SASE to: **RJ & US IMPORTS,** Box 157, Mortdale, NSW. 2223. (No inquiries at office . . . 11 Macken Street, Oatley). Agencies at: Geoff Wood Electronics, Lane Cove, NSW. Webb Electronics, Albury, NSW. Truscott Electronics, Croydon, Vic. Willis Trading Co, Perth, WA. Electronic Components, Fishwick, Plaza. ACT.

WANTED — NSW

GENERAL COVERAGE COMMUNICATIONS RECEIVER: DX160 or similar. Any model or condition considered. Peter VK2APJ, QTHR. Ph:(047) 59 1651.

WANTED — VIC

INSTRUCTORS: To teach AOCP or AOCP Novice Course in 1988. Attractive pay rates apply. Course duration is 3 hours per night for 16 weeks. For further details contact Peter or Ian VK3COE. Outer Eastern College of TAFE. Ph:(03) 220 8826.

WANTED — QLD

HD ROTATOR: Prefer Diawa 7600R. Also 4 el monoband Yagi, for 20m. Both must be as new and in excell cond. Albert VK4CL, QTHR. Ph:(070) 55 1036.

FOR SALE — NSW

CDE ARR22 ROTATOR: with control. Suit small HF beam viz TH3jr/TH3mk3. Fair condx. $200 ONO. Simplex semi-auto key made by Leo Cullen. Good condx. Also, Autronic (USA) key to suit electronic keyer. New. What offers? Art VK2AS. Ph:(02) 467 1784.

FT-290R 2m FM/SSB TRANSCEIVER: Unused condition. $500. NEC CQ-110E HF transceiver. 160-10m, 12 and 240 volt operation, CW filter. Handbook, with full service information, excellent operating order, digital frequency readout. $425. VK2AYO, QTHR. Ph:(02) 489 2417, 7 pm on weekdays, or anytime weekends.

OSCILLOSCOPE: H/P CRO Dual Trc. Model 170A 30 MHz — op & service manual, working order. $200. VK2SU, QTHR. Ph:(069) 68 1556.

SHACK SELLOUT: 20 MHz dual trace CRO. $750 inc probes. Digital function generator — sine, square, triangle waves to 2 MHz. Use as frequency meter to 10 MHz. TTL/CMOS pulse outputs, etc. $400. Digital benchtop multimeter. $250. Kenwood R-5000 communications receiver. $950. All gear less than 6 months old, still under warranty, excellent condition. Any reasonable offers, Must sell, going overseas soon. VK2XRG. Ph:(02) 625 4490.

SWAN 350: with power supply, handbook, and spare set of valves except finals. As is $100. Charles Aston VK2YH, 61 Mitchells Pass, Blaxland, NSW. 2774. Ph:(047) 39 2464.

WIND-UP TOWER: Deceased estate. 22.5m, Hills. Very good condition, 3 section. Offers to David. Ph:(02) 29 1768 BH or (02) 498 2259 AH.

FOR SALE — VIC

POWER SUPPLY: Lambda LMF15V, 9-20V DC adjustable, 28 amp, regulated with overload protection, excellent condition. $250 ONO. VK3KOA, QTHR. Ph:(03) 45 1731 AH.

YAESU FT-290R TWO-METRE ALL-MODE TRANSCEIVER: excellent condition. Complete with carry case, nicad rechargable batteries, instruction manual, carton. Also, 2m side-mount aerial, J-pole, coax and connectors. $400 the lot. Alan VK3KRP, QTHR. Ph:(03) 743 4385.

FOR SALE — QLD

DRAKE MN2000: 2kW antenna tuner. $350. Speech processor, Japan, works well, but no longer needed. $30. UA78HG voltage regulator desperately needed. Can anyone help? Please advise cost, including post to John VK4SZ, QTHR. Ph:(070) 61 3286.

KENWOOD TS-130 TRANSCEIVER: as new. $750. Also Kenwood antenna tuner, AT-130. New $150. Albert VK4CL, QTHR. Ph:(070) 55 1036.

FOR SALE — WA

KENWOOD TS-430S HF TRANSCEIVER: New condition. $975 ONO. Lance VK6MD. Ph:(09) 293 4331.
Licenced amateurs only.

FOR SALE — TAS

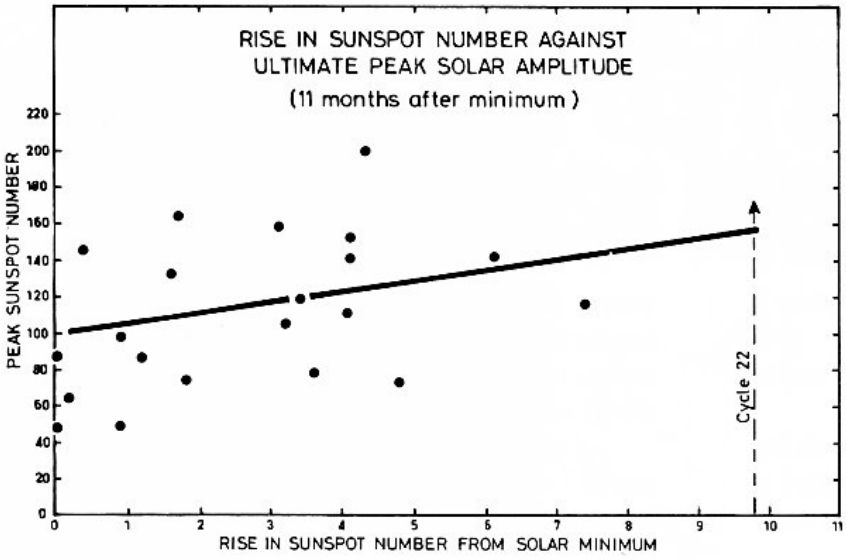
KENWOOD TS-520S. Excellent cond, unmarked, CW filter, svce man, Mic. $525. DG5 digital readout suit TS520S. $225. As new. All with books, leads, etc. Pair $700. VK7AN. Ph:(003) 31 7914.

❖ ❖ ❖

Advertiser's Index

❖ ❖ ❖

JANUARY ISSUE



THE NEXT SOLAR PEAK – HOW BIG WILL IT BE?

Last January we said "Kiss Your Last Big Sunspot Maximum Goodbye". Well, you might not have to! Richard Thompson of IPS Radio & Space Services details what looks like good news!

Roger Harrison's
Australian ELECTRONICS
Incorporating Elektor Electronics
Monthly

DON'T MISS IT!

$4.75 AT YOUR NEWSAGENT

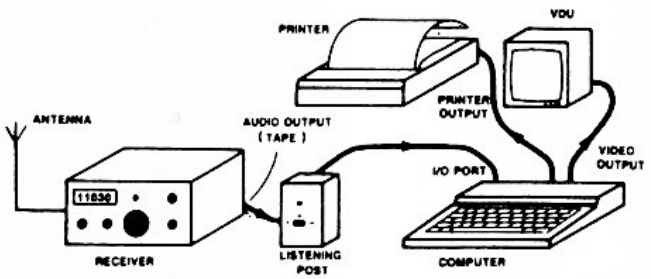
BUILD A STAND-ALONE RTTY/MORSE DECODER

No computer required! Just hook it up to the audio output of your receiver and any dot matrix printer. If you don't have a computer – here's how to get into electronic RTTY. If you do have a computer, free it up for other uses!

More electronics you can use. Every month.

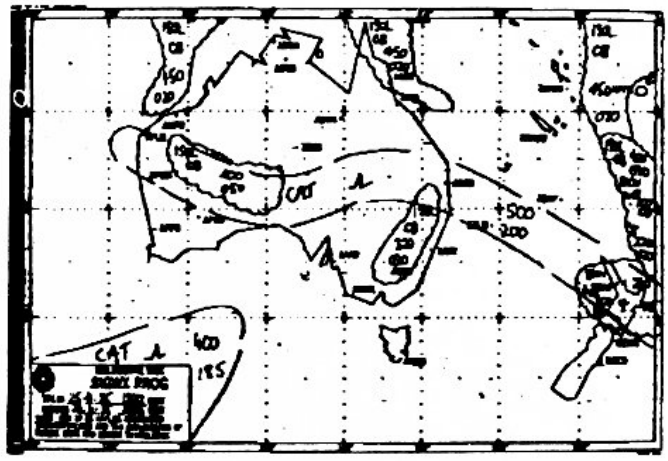
Wholly independently produced by Editor/Publisher Roger Harrison VK2ZTB through Kedhorn Holdings P/L, PO Box 507, Wahroonga 2076 NSW.

RECEIVE WEATHER FAX, RADIOTELETYPE AND MORSE CODE TRANSMISSIONS USING YOUR COMPUTER



Build the Australian Electronics Monthly "Listening Post" (AEM3500), a simple add-on decoder project – it goes between the audio output of a HF (shortwave) communications receiver and the I/O of your Commodore 64 or Microbee computer; software then decodes the transmissions for you. Print weather maps, foreign news service broadcasts, amateur and commercial radioteletype or Morse transmissions. *

Fascinating! Useful, too.



FAX picture

SOFTWARE ONLY: $25.00
– includes all instructions on the decoder & s/ware.

LISTENING POST "PACKAGE": $35.00
– you get software, quality fibreglass pc board with component overlay and full how-to-build instructions plus software operating details. (Components are widely sourced by electronics retailers).

*C64 software does not provide Morse decoding.

Send coupon to: AEM Software Service, PO Box 507 WAHROONGA 2076 NSW.

Send us a blank C10 cassette or a formatted disk for us to transfer the software onto.

SEND ME THE LISTENING POST:
☐ SOFTWARE ONLY
☐ FULL PACKAGE

My computer & printer are:
☐ Microbee/C.Itoh 8510-type
☐ Microbee/"Epson" FX80-type
☐ C64 or C128/(most printers)

I am paying by: ☐ Cheque ☐ Money Order ☐ B/card ☐ M/card ☐ Visa
(Make out cheques or money orders to: Aust. Electronics Monthly)

Card No ..... Expiry .....
Signed .....
Name .....
Address .....
..... P/code .....

Or phone and pledge your plastic: (02)487 1207.

BAD NEWS FOR ANYONE WHO EXPECTED BIG THINGS FROM ICOM.

The biggest news in hand held transceivers is actually very, very small.

It's the new generation ICOM IC-μ4AT and its midget twin, the IC-μ2A.

Both pack all the performance and reliability you expect from ICOM into a tiny package. And although they weigh next to nothing, they're not light-on for features, as you'll see.

The IC-μ4AT has built-in power saver circuitry that uses as little as 8 mA of current flow during standby. So it will last up to four times longer than some older equipment. Yet it measures only 58mm wide by 140mm high by 29mm deep with optional BP-22 battery pack.

It also has a DTMF pad, 10 memory channels with convenient digit up/down switches, subaudible tone encoder, and a comprehensive LCD display with special backlighting that turns off when not being used.

The IC-μ4AT can operate at a full 2W of output power from the optional BP-24 or optional converter with 12V battery. And its durability makes it ideal for operating in rugged outdoor environments.

The IC-μ2A also has 10 memory channels and the top panel LCD for easy readability and puts out up to 2.6W of output power from the BP-24 battery pack.

Like its counterpart, this 2 metre transceiver features Digital Touchstep Tuning for fast shirt-pocket frequency adjustments. And of course, both can use most existing ICOM hand held accessories plus a new line of long life nicad battery packs.

So if you want big things from a small transceiver, get your hands on the ICOM micros soon.

For details of your local dealer phone ICOM on Melbourne (03) 529 7582 or (008) 33 8915 from elsewhere in Australia.

ICOM